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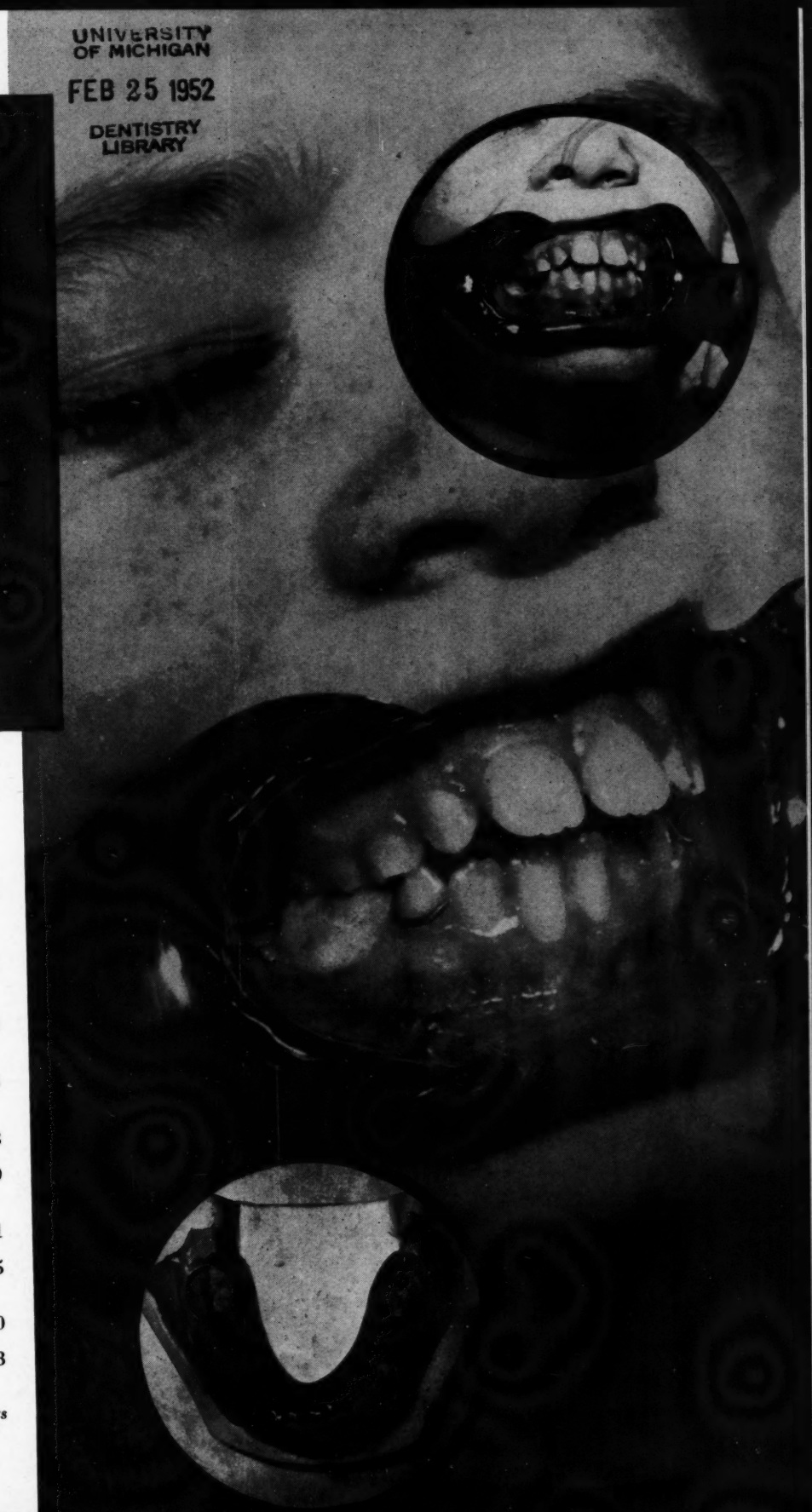

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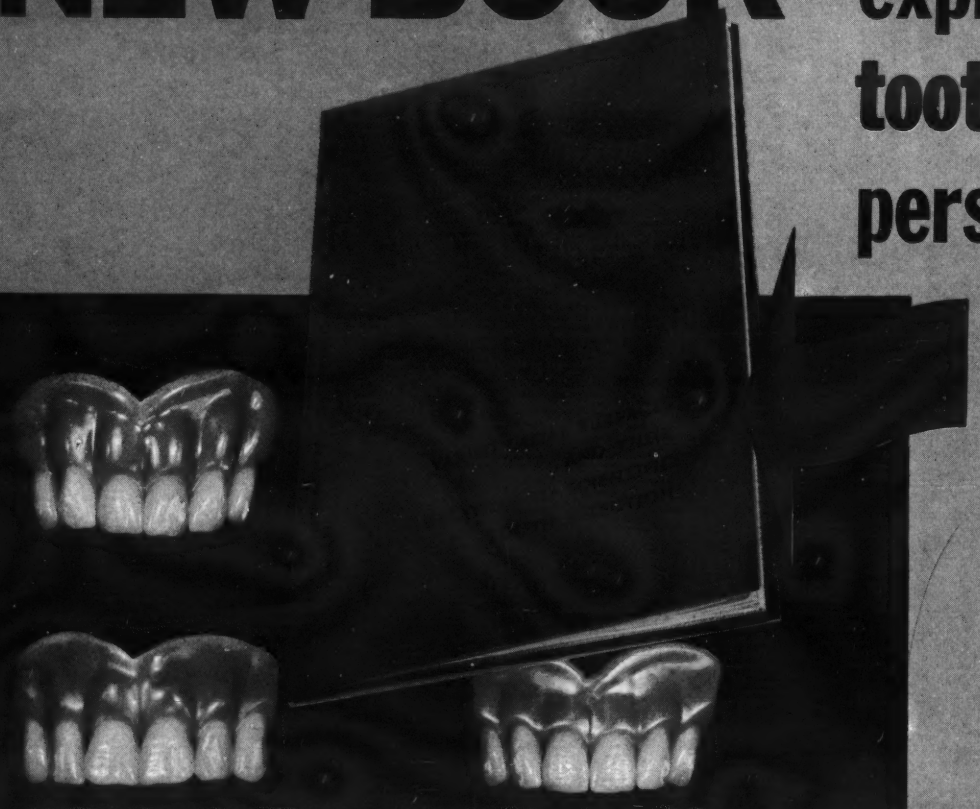
NEW BOOK explains science of tooth selection for personalized dentures..!



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About Our CONTRIBUTORS

A. C. HEIMLICH, D.D.S. (University of Southern California, College of Dentistry) emphasizes orthodontics in his practice. Doctor Heimlich publishes in DIGEST for the first time this month, presenting an illustrated two-part article, SELECTIVE GRINDING AS AN AID TO ORTHODONTIC THERAPY.

In the second installment of his three-part article, JUVENILE PROSTHESIS FOR THE GENERAL PRACTITIONER, Doctor Louis B. Kelsten discusses the various types of maintainers, the situations where they may be used, and gives step-by-step instructions for their design and application.

LEONARD FRANK, a well-known roentgenologist, is a regular contributor to DENTAL DIGEST, having presented a number of highly definitive articles reporting the results of his own research. His article this month visualizes the Bennett movement from three planes of observation, all of which are illustrated in detail.

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SELECTIVE GRINDING

*As an Aid to Orthodontic Therapy** – Part One

ALBERT C. HEIMLICH, D.D.S., Santa Barbara, California

DIGEST

This article demonstrates how the removal of points of interference in finished orthodontic cases will help to stabilize the teeth in their new positions and to avoid trauma with its resultant damage to dental structures.

The importance of selective grinding in relieving these traumatic conditions is discussed and rules governing success in equilibration of teeth are outlined. The various technical applications of the basic principles are described in detail and each step in the procedure is illustrated.

Goal of Orthodontic Therapy

Orthodontists are interested in any technique that will be helpful in achieving a more nearly perfect result in treatment. Attention has been focused on the operations necessary to bring the teeth into proper alinement while the importance of developing a balanced occlusion and consequently keeping the teeth stabilized and healthy in their new positions is frequently forgotten.

Routine Methods—1. Complete records are taken. 2. The case is thoroughly analyzed. 3. Each band is carefully placed. 4. Full use is made of appliances and the latest techniques during active treatment. 5. Retainers are placed.

Natural Forces Uncooperative—After the several routine steps have been taken the forces of nature are frequently trusted to settle the teeth into a balanced occlusion during the retention period. These forces are often uncooperative and it is during the retention period that some orthodontists fail to employ an important aid in preventing traumatic occlusion and in preserving the results of treatment; the aid referred to is selective occlusal spot grinding which is accomplished for the most part during the retention period.

Purposes of Selective Grinding

1. Selective occlusal spot grinding is used to recontour the part of a tooth which interferes with normal, balanced occlusion.

2. It is extremely important that the greatest of care be exercised in choosing the areas to be ground and in judging the amount of tooth structure to be sacrificed.

3. While equilibration is indicated in most mouths that have been treated orthodontically, equilibration must not be considered a means for trying to save cases that have been improperly treated.

Regulation of Teeth—Selective grinding is the final step in the regulation of teeth. To be most effective (1) it must be preceded by an accurate diagnosis, (2) each tooth must be placed in the position where it may best function in unison with the other teeth, and (3) a carefully supervised retention period must ensue.

Knowledge of Occlusion Important—The extent of the dentist's knowledge of occlusion will govern in a large measure the success of orthodontic treatment.

Causes of Occlusal Interference

It would seem that occlusal grinding would not be indicated in a well-treated case, (1) as it is possible to place each tooth individually with appliances, and (2) positioners may be utilized if it is desired. There are, however, some factors over which the appliance and its aids have no control: (1) a discrepancy in tooth size and shape, (2) lack of wear on nonfunctional or impacted teeth, (3) poorly contoured restorations. These conditions all result in occlusal interference.

Factors Involved in Malocclusion

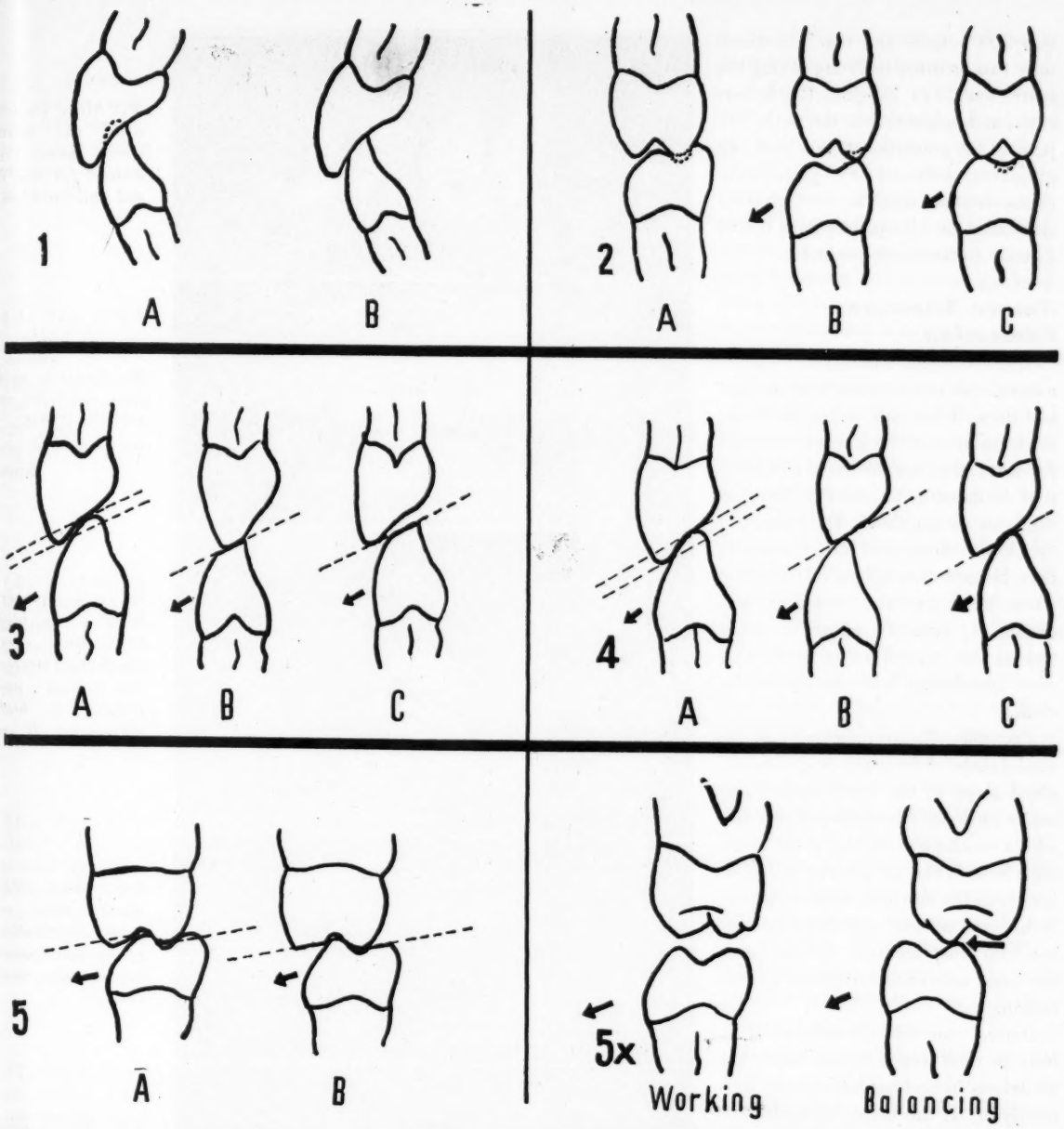
1. Positioners themselves sometimes lock teeth with steeply inclined planes so tightly together that eccentric movements are inhibited.

2. Teeth in malocclusion have developed facets of wear to allow for acceptable balance and function. When these teeth are moved to new positions, the old facets are no longer in use. Nature cannot carve new facets quickly and as a result a few teeth assume the load intended for many.

Results of Traumatic Occlusion

When one or two teeth are forced to assume the load that was meant for several, or when there is occlusal interference, a traumatic condition results. Few mouths can withstand con-

*This is a revised version of an article that first appeared in *The Angle Orthodontist* **21**:76-87 (April) 1951 and is reproduced with the permission of that publication.



1, 2, 3, 4, 5, and 5X. *Examples of the important fundamental principles in occlusal correction.*

6. *Auxiliaries used for occlusal equilibrating; knife-edge and cylindrical stones, polishing disc, and articulating paper.*

tinued traumatic occlusion indefinitely. Therefore, unless this condition is relieved, there will occur sooner or later a definite breaking down of the tissues.

This is readily understood when it is realized that the crushing strength in the molar region is between 100

and 200 pounds and that sometimes only two or three teeth are taking the entire load. (1) Erosion, (2) hyperemia, and pulpstones in the teeth, (3) pain in the condylar region, and (4) gingivitis followed by periodontoclasia in the gingival and alveolar structures have frequently been traced directly to traumatic occlusion.

Nature Attempts Protection

When occlusal interference occurs nature tries to move the teeth to protect them. When one or two teeth are made to assume the burden intended for many, they are subjected to a force that is capable of moving them as surely as an appliance. The relapse of the lower anteriors has frequently been blamed on erupting third molars when in reality the crowding was caused by nature's effort to avoid trauma by repositioning teeth that were interfering with normal occlusion.

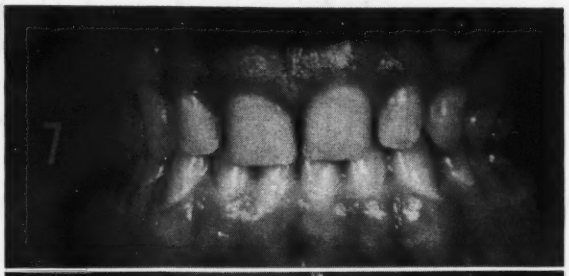
Example—An over-occlusion of the mesial slope of the upper cuspid on the distal slope of the lower cuspid can easily push the lower cuspid mesially with a resultant crowding of the lower anteriors. When an interfering tooth is not readily movable, such as mesially inclined second and third molars, condylar displacement follows with the usual untoward symptoms in that region.

Defects not Self-Corrective—It is folly to take refuge in the hope that all defects in occlusal balance are self-rectifying. If the major obstacles are removed by selective grinding nature will assist in accomplishing the final milling in.

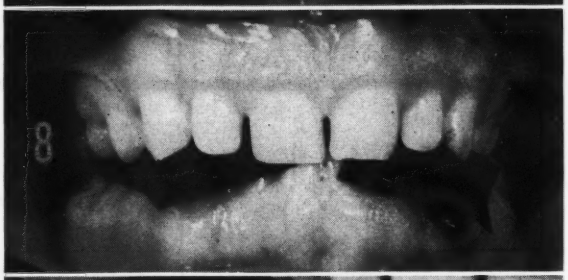
Procedure in Equilibration

The teeth should not be equilibrated at one sitting but more ideally, at several. This should be done for the most part during the retention period. The following steps may be taken:

1. When the bands are removed and retainers are placed, a minimum of grinding is done. Only major obstacles, particularly severely interfering cuspids, are relieved. The reason for this is obvious: The teeth will settle even with retainers in place and

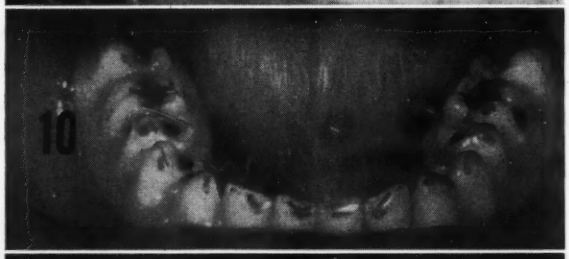


7. *Nine months after the bands have been removed for the final equilibration.*



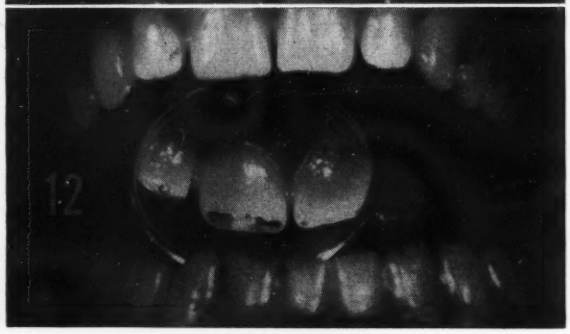
8. *Centric position must be established first.*

9. *Look for overloading on high restorations, oversized and interfering cusps and ridges. A high restoration is revealed.*



10. *The blue marks show an even distribution of contact points in centric position.*

11. *The patient is instructed to bite into protrusive position.*

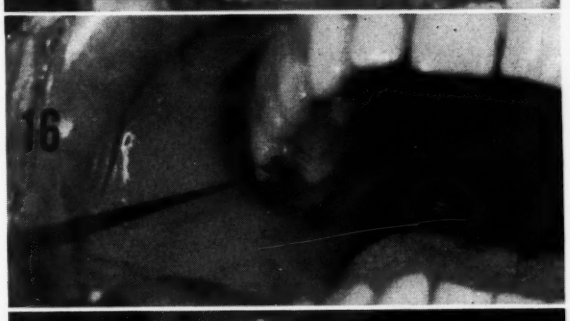


12. *Areas of interference on the lingual incisal surfaces of the upper right central are revealed by articulating paper.*

13. *Protrusive position is rectified. Note that the lower left lateral projects incisally in the distal.*

14. *The patient is asked to slide forward in protrusive excursion. The anterior teeth open slightly as the jaw slides forward.*

15. *Carbon paper bears out the impression of posterior interference on a lower buccal cusp.*



16. *Directly ahead of the pointer is seen a blue mark denoting that a lower buccal cusp is contacting an upper buccal cusp.*

17. *Grind the upper buccal cusps and not the lower buccal cusps. After the correction the excursion from centric to protrusive can be accomplished without hindrance.*

18. *Most of the equilibrating is done for lateral excursions because most food is ground during this function.*

some of the interference will be, at least in part, self-adjusted.

2. In the course of the next few weeks the teeth should be relieved again to a minor degree.

3. In from six to nine months the teeth will have settled to a reasonably stable relationship. At this time the greater part of equilibration is completed with the end in view of *distributing the masticatory forces over the largest indicated number of teeth in all positions and excursions.*

Masticatory Exercises Introduced—At this time it is desirable to introduce masticatory exercises designed to teach the patient how to chew in eccentric excursions. This is particularly true if he has not been able to do so before. The benefits are threefold: (1) chewing efficiency is increased, (2) investing tissues are properly stimulated, and (3) retention is supplemented.

Aid to Nature—Throughout the entire period of adjustment it must be borne in mind that the purpose of procedure is to produce a free, unobstructed, balanced occlusion. It is important (1) that a *minimal* amount of tooth structure be removed, and (2) that removal is done in a systematic manner. Each time the patient presents for occlusal adjustment (1) centric position, (2) protrusive position, (3) protrusive excursion, (4) right and left lateral excursions should be observed and corrected.

Anatomic markings that are lost during equilibration should be restored so that cutting efficiency is not diminished.

Rules Governing Success in Correcting Occlusion

The following rules govern all the selective grinding that is done on natural teeth. Although it is seldom necessary to apply every rule in correcting an orthodontic case, a thorough knowledge of all the rules is imperative.

Rule 1—If there is premature contact in the anterior part of the arch in centric relation, relieve the labial incisal of the lower teeth. In Figure 1, (A) the dotted area represents the amount of tooth structure that was in

excessive contact. This amount would be removed from the labial incisal of the lower tooth as seen in Figure 1, (B).

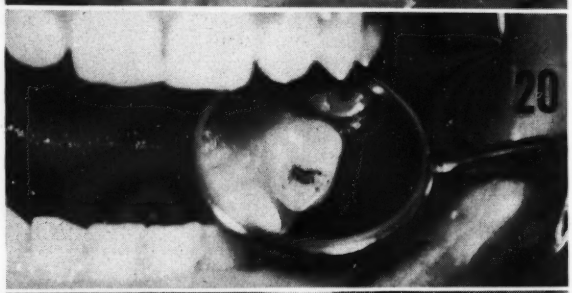
Rule 2—If there is premature contact between cusp and fossa in centric relation in the posterior segments, as represented by the area between the dotted lines in Figure 2, (A), move the interfering teeth into their functional relation as shown in Figure 2, (B). If the prematurity is still apparent, reduce the cusp as shown in Figure 2, (B). If the interference is not apparent in functional relation, reduce the fossa as shown in Figure 2, (C).

Rule 3—If there is premature contact in the interior part of the arch in eccentric excursion, relieve the lingual incisal of the upper teeth. The broken line represents the correct path of occlusion. The part of either tooth in Figure 3, (A) that lies between the dotted lines might be removed to allow for acceptable function in lateral excursion. If it is elected to relieve the *lower* tooth as shown in Figure 3, (B), contact will be provided in lateral excursion, but, as shown in Figure 3, (C), contact in centric relation is lost. The alternative is to remove the part of the *upper* tooth that is between the dotted lines (Fig. 4). Then there is contact not only in lateral excursion as shown in Figure 4, (B), but also in centric relation, as shown in Figure 4, (C).

Rule 4—Figure 5. In the posterior region, on the working side only the *buccal* cusps of the upper teeth and the *lingual* cusps of the lower teeth are relieved. Note that in Figure 5, (B) the untouched upper *lingual* and lower *buccal* cusps maintain the maxillomandibular opening. Again the dotted line indicates the path of occlusion.

Rule 5—Figure 5X. When premature contact is apparent on the balancing side, grind whichever interfering cusp is least needed in other positions and excursions. Figure 5X shows that upper lingual cusps contact lower buccal cusps during balancing side interference. These are the cusps that maintain vertical dimension. Therefore, only one can be relieved, not both. To decide which cusp is least used and consequently to be relieved, the interfering teeth in centric relation and in functional excursions must be studied.

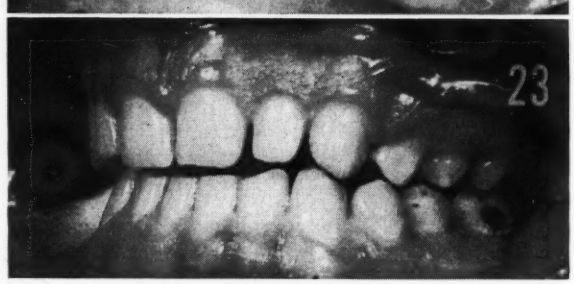
19. *Many cases that appear to be successful in centric position as shown in Figure 18, are faulty in lateral excursion.*



20. *That part of the upper tooth which contacts in centric position is represented by the part of the carbon paper nearest the gingiva.*

21. *The area on the cuspid which centers into lateral excursion has been ground, while the part of the carbon mark representing centric position has been carefully avoided.*

22. *Test again with articulating paper. There is marked interference on the first bicuspids.*



23. *Once more testing the lateral excursion, the patient immediately notices interference on the balancing side. This is verified by spacing between all working side contacts.*

Basic General Rule

If it were possible to incorporate all five of the rules described into one provision it would be this: *In correcting the contacts of one jaw relationship, do not mutilate those of another.*

Technical Application of Basic Principles

The case chosen to demonstrate the basic principles that have been outlined was selected because it involves most of the problems routinely en-

countered in occlusal adjustment subsequent to treatment. In applying the technique it is important to take each step in order.

Materials Required—The only auxiliaries needed are a knife-edge stone, a cylindrical stone, a polishing disc, and some articulating paper (Fig. 6).

Establishing Centric Position—The patient presents nine months after the bands have been removed for his final equilibration (Fig. 7). He has been taught how to bite in all positions and to move in all excursions. Centric position (Fig. 8) must be established first:

1. Carbon paper is placed in each side of the mouth and centric position is registered.

2. Look for overloading on high restorations, oversized and interfering ridges, and cusps.

3. In this case a high restoration is exposed (Fig. 9). Note the light area in the center part of the carbon mark on the lower right molar, indicating over-occlusion.

4. This spot is relieved according to the rule for adjusting posterior teeth in centric relation. The blue marks now show an even distribution of contact points in centric position (Fig. 10).

Grinding in Other Positions and Excursions Must Not Disturb Centric—1. The patient is instructed to bite into protrusive position (Fig. 11). The objective is to secure a maximum of contact with as little grinding as possible. Most of our food is eaten with utensils so that it is not mandatory to have all anterior and posterior teeth contacting simultaneously in the protrusive position or excursion.

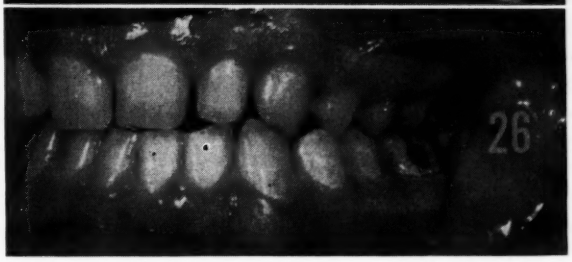
2. Any irregular surfaces due to malformation or chipped edges are leveled off and made more esthetic. The rules remind us to confine grinding to the lingual incisal surfaces of the upper teeth.

3. The use of articulating paper reveals areas of interference on the lingual incisal surfaces of the upper right central and lateral (Fig. 12). These areas are relieved and grinding is completed for protrusive position (Fig. 13).

4. Note that the lower left lateral projects incisally on the distal (Fig. 13). This point was left because the esthetics are not objectionable and it is in function in lateral excursion as will be shown.

24 and 25. *Checking with carbon paper reveals that the buccal slope of the lingual cusp of the upper second molar contacts the lingual slope of the buccal cusp of the lower second molar.*

25A. *The upper lingual cusp was least used in other positions and excursions so that it is relieved.*



26. *The steepness of the guiding planes above and below on the balancing side have now been reduced until the working side is uniformly in contact during lateral excursion. Note that the upper lateral contacts the lower lateral on its high distal point.*

Posterior Interference Relieved—1. The patient is asked to slide forward in protrusive excursion (Fig. 14). The anterior teeth open slightly as the jaw slides forward.

2. There seems to be some posterior interference. Carbon paper bears this out (Fig. 15). Directly ahead of the pointer a blue mark can be seen denoting that a lower buccal cusp is contacting an upper buccal cusp (Fig. 16).

3. Grind upper buccal cusps and not lower buccal cusps. After this correction is made the excursion from centric to protrusive can be accomplished without hindrance (Fig. 17).

Equilibrating in Lateral Excursion—Most of the equilibrating is done for lateral excursions because most food is ground during this function. Many cases that appear to be successful in centric position (Fig. 18) are faulty in lateral excursion (Fig. 19). The objective in this excursion is to secure simultaneous contact of as many teeth as possible on the working side. The balancing side contact is desirable although it is dangerous if premature contact exists.

Chewing Stroke Guided by the Condyle: With carbon paper in place on the working side, the patient bites with his normal chewing stroke from lateral to centric position. It is extremely important that the registration be made in this manner rather than in the usual way of sliding from centric to lateral because the chewing stroke must be guided by the condyle and not by the newly placed teeth.

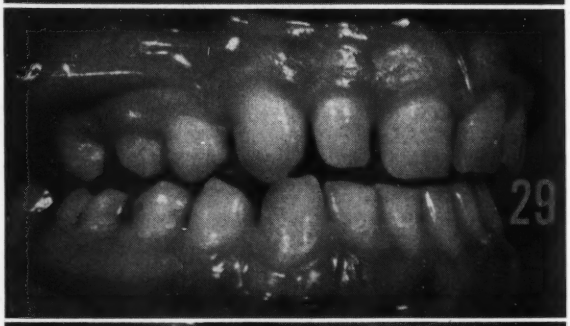
Cuspids Relieved First: The cuspids are clearly the main point of interference; this is a common occurrence and can be minimized during treatment by soldering cuspid brackets toward the incisal edge. Be careful not to remove that part of the upper tooth which contacts in centric position.

In Figure 20 this area is represented by the part of the carbon mark nearest the gingiva. The area on the cuspid that enters into lateral excursion has been ground (Fig. 21) while the part of the carbon mark representing centric position has been avoided.

Note: If too much tooth structure needs to be taken from the upper cuspid to allow function in this lateral movement, it is permissible to grind the lower cuspid provided the part of the tooth contacting in centric position is not disturbed.

27. *Carbon paper shows that there is simultaneous contact of all opposing teeth on the working side.*

28. *The opposite working side is relieved in the same manner.*



29 and 30. *The right excursion before and after grinding is shown. Occlusal adjustment is now completed.*

First Bicuspids Now Main Points of Interference—1. Test again with articulating paper (Fig. 22). The white area inside the blue mark on the lower second bicuspid shows the area of excessive contact.

2. Grind the complementary mark on the buccal cusp of the upper bicuspid.

3. Test the lateral excursion (Fig. 23). The patient immediately notices interference on the balancing side and this is verified by spacing between all working side contacts.

4. Checking with carbon paper (Fig. 24) reveals that the buccal slope of the lingual cusp of the *upper* second molar contacts (Fig. 25) the lingual slope of the buccal cusp of the *lower* second molar.

5. The upper lingual cusp was least used in other positions and excursions (Fig. 25A) so that it was relieved until the working side became uniformly in contact during lateral excursions (Fig. 26).

Note: The upper lateral contacts the lower lateral on its high distal point. This is the reason that the point was not removed while improving the esthetics in protrusive position.

Final Steps: The carbon paper shows that there is simultaneous con-

tact of all opposing teeth on the working side (Fig. 27). The opposite working side is relieved in the same manner (Fig. 28). Right excursion is seen before grinding (Fig. 29), and afterwards (Fig. 30). Occlusal adjustment for the most part is completed.

(*To be continued next month*)

1824 *State Street*

Sensitization to Denture Material as a Cause of Angular Stomatitis

H. R. VICKERS, M.Sc., M.B., M.R.C.P., Sheffield, England

Attributable to Many Causes

Cracking of the angles of the mouth may be due to many causes: (1) Mechanical maceration by dribbling resulting from ill-fitting dentures, (2) direct infection with monilia, staphylococci, or streptococci, and (3) to that arising in association with vitamin deficiency, particularly in ariboflavinosis.

A Cause not Generally Recognized —Attention is called to a further cause, not generally recognized, which is fissure formation due to stomatitis caused by sensitization to denture material. Of nine causes of denture stomatitis seen during the last four years, in seven consultation was because of cracks at the angles of the mouth, and only after direct questioning did these patients mention painful gingival tissue. All seven cases had been treated by local applications and by various vitamins without success, some of them for several years.

Recognized Causes — Stomatitis arising from sensitization of the buccal mucous membrane to the material of which dentures are made has been recognized for many years.

1. It has been stated that probably the substance mainly responsible for the stomatitis is vermilion (mercury sulphide) which is easily liberated on the mucous membranes.

2. Glossitis has been described in a patient who was shown to be sensitive to a "plastic" type of denture by patch testing.

3. Three cases have been described of stomatitis due to sensitization to the newer plastic materials, two of which gave positive patch tests to the dentures strapped on to the arm for forty-eight hours. It has been shown that it is necessary in some cases to perform the patch test on the mucous membrane to demonstrate sensitivity and a technique for doing this has been devised.

Method of Testing

The patch tests in the cases reported were performed by taking scrapings from the denture which was suspect and leaving these moistened scrapings in contact with the skin of the upper arm for forty-eight hours. There was no difficulty in reading the results. A more spectacular way is to strap the whole denture on to the skin but the patients did not wish to be without their teeth for a period of two days.

Common Feature

In addition to the cracks at the corners of the mouth, the one feature common to all the patients was redness and engorgement of the whole of the mucous membrane which came into contact with the denture. The sharp line between the red inflamed denture-covered part of the hard palate and the adjoining normal uncovered part was most striking. In some cases the mucous membrane of the cheek was also affected, and one case had superficial glossitis of that part of the tongue in contact with the denture. All have been cured by changing their type of denture.

Case Reports

Case 1—A woman aged 31 complained of having had cracking at the angles of the mouth for the previous six years; this started about six months after wearing a new denture. She had failed to respond to many different preparations. There was no history of previous trouble and her general health was reported to be good.

Examination—(1) The cracking of the angles of the mouth was severe and there was redness and swelling of all the mucous membrane which came into contact with her dentures. (2) The line of demarcation on the hard palate between the engorged mucous membrane and the normal looking posterior part of the palate was well marked. (3) There was no history of previous skin disease or of any relevant past illness. (4) The dentures were made of red vulcanized rubber and a patch test performed with scrapings was strongly positive, blisters having formed on the skin of the upper arm after contact with the scrapings for forty-eight hours.

Treatment—The patient was advised to stop wearing her dentures and to have a "plastic" denture after first being tested with the plastic material to be certain that she was not also sensitive to that. When seen three months later she was completely cured. Four years later she stated that she had had no recurrence whatever.

Case 2—A woman aged 46 gave a history of cracking of the corners of the mouth for one month, also for a week before being seen she had mild dermatitis of the circumoral region, chin, and neck. She had worn "plastic" dentures for six years and during this time often had ulcers of the gums. There was no previous history of skin disease.

Examination—(1) She had marked cracking of the angles of the mouth with a dry scaling dermatitis of the circumoral region, the chin, and the anterior aspect of the neck. (2) The mucous membrane in contact with the dentures was red and engorged and showed the sharp line of demarcation

(*Continued on page* 72)

JUVENILE PROSTHESIS

for the General Practitioner—Part Two

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DIGEST

For a space maintainer to serve its purpose properly (retain space for a succeeding tooth) it must be correctly constructed and its functioning quality in the child's mouth must be periodically checked.

In this installment which is the second of a three-part discussion of juvenile prosthetic appliances, the various types of maintainers are described in detail, the numerous possible situations where they will be indicated, and step-by-step instructions for their design and application are illustrated.

Designing the Appliance

The proper designing of a space maintainer and its periodic observation are necessary if the appliance is to be of benefit to a child. In fact, unless a retainer is properly constructed and its function observed, it can prove harmful (Fig. 11). The dentist should explain to the parent that a space maintainer will do no more than retain the space for the succeeding tooth and will not prevent a malocclusion in another section of the jaws.

A Passive Appliance—A space maintainer is a passive appliance and in most cases, besides maintaining space, should meet the following requirements:

1. It should be functional.
2. It should prevent extrusion of the teeth in the opposite jaw.
3. It should be durable.
4. It should be compatible to the health of the tissues.
5. It should be simple to construct.

Cast Retainer Recommended—The space maintainer should function so that the child will chew properly and not overload and thereby predispose any section of the mouth to breakdown and abnormal growth. Because extremely young children are apt to chew sticky foods and tug at appliances with their fingers, the cast retainer is ideal for use over a period of many years. Frequently, where orthodontic bands are used for abutments, the appliance becomes loose or the wire connecting the bands is bent or broken so that the retainer is useless or even harmful to the child (Fig. 12).

Advantages of the Cast Space Maintainer—1. The cast space maintainer can be made as durable and functional as a fixed bridge (Fig. 12), while the proper fabrication of orthodontic bands on deciduous teeth is relatively difficult.

2. A cast restoration has a more perfect gingival fit than that obtained with orthodontic bands and is therefore more compatible to the tissues.

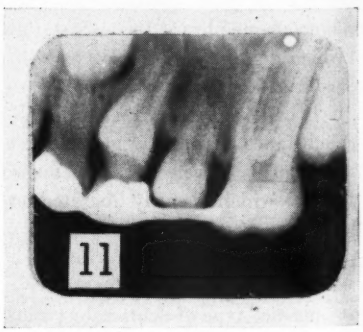
3. The average dentist is well equipped for constructing the cast space maintainer (1) because he is familiar with waxes and the casting technique, and (2) because the preparation of the abutment teeth and the impression technique are relatively simple and rapid.

Other Types of Maintainers

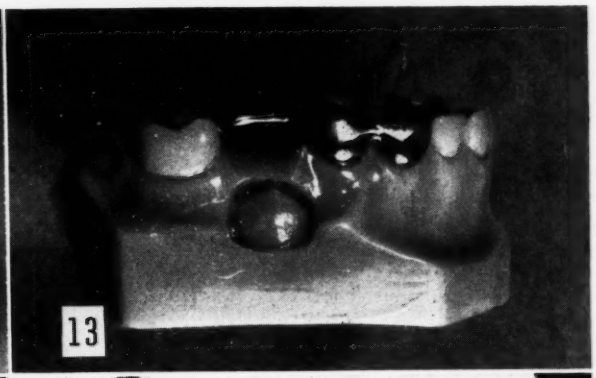
Acrylic—Where spaces are long and bilateral and in the presence or absence of posterior teeth, a simple acrylic retainer can be made with clasps which are removed after the child has become accustomed to the appliance (Fig. 14).

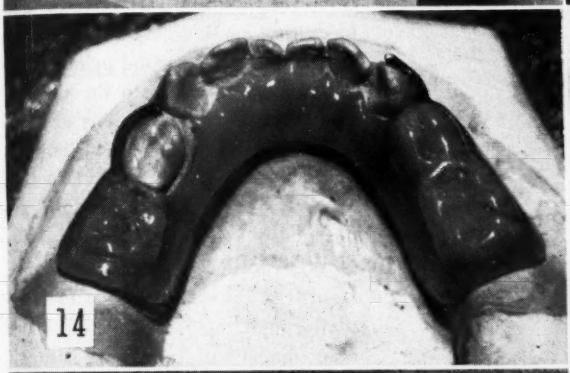
Passive Lingual Arch—In older children with multiple missing primary posterior teeth of one jaw, the passive lingual arch anchored to cast or wrought bands is recommended as the bar type of space maintainer or the partial denture may interfere with the eruption of the first bicuspids (Fig. 15).

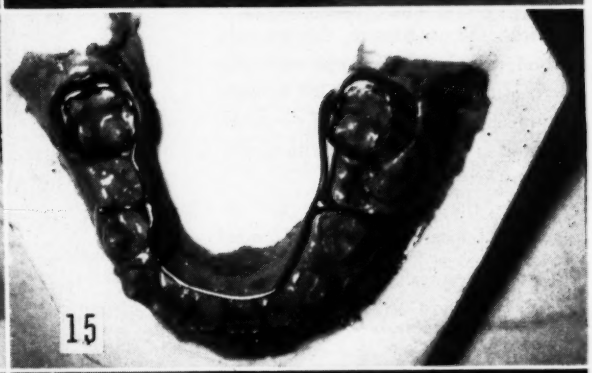
Properly made wrought bands can be used for the lingual arch as this appliance is worn for a relatively short period and the connecting arch wire is close to the mucosa and therefore fairly safe from sticky foods.



11. ***Over-retained appliance due to child's failure to return for periodic check-up. Serious harm, such as caries and rotation of the erupting tooth can be caused by an appliance unless it is under observation.***







12. ***Orthodontic type of space retainer. With inexperienced operators this type of appliance may cause difficulty because of repeated loosening of bands or bending and breakage of extension wire.***

13. ***Cast functional space maintainer. Note that the abutments resemble those of fixed bridges. This type of appliance rarely needs recementation and will remain in place until the abutment teeth are shed.***

14. ***Acrylic retainer.***

15. ***Passive lingual arch appliance. Note how the wire against the lingual surface of the anterior teeth prevents their collapse and how the spurs maintain the erupting bicuspids in position.***

16. ***Position of bar for maxillary space maintainer in order to obtain maximum function. The part of the bar in contact with the six-year molar should be highly polished.***

17. ***Appliance in occlusion with opposite jaw.***

Responsibility of General Practitioner—With some experience the conscientious dentist can readily learn to make the types of simple appliances described, for the technique is not a departure from his general routine. It is the responsibility of the general practitioner (not of the orthodontist, as is commonly believed) to employ space maintenance in his practice. It is the general dentist who sees children with primary and mixed dentitions where malocclusions can be prevented and the dentist in general practice is more experienced in dealing with extremely young children and is therefore better equipped to prepare the primary teeth for cast ap-

pliances which prove most practical over a period of many years.

Specific Applications

1. Where primary teeth are used as abutments they are prepared for cast crown restorations. (Techniques will be discussed in the March installment.)

2. Where young permanent teeth are used as abutments, they are never cut or mutilated; cast or wrought bands are used.

3. Where a mandibular incisor is required for anchorage, the wrought orthodontic band is employed. The occlusal bar is recommended because it simplifies the problem of construction and is sufficiently functional during mastication.

4. For the mandible the bar replaces the buccal cusps and is extended under the central fossae of the teeth of the opposing jaw.

5. For the maxilla the bar replaces the lingual cusps and is extended over the central fossae of the teeth of the lower jaw (Fig. 16). Extending the bar in this way helps make the space maintainer functional and prevents opening the bite or permitting the opposing cusps to force the bar into the gingival tissues (Fig. 17).

Cantilever Type of Appliance—Where the first primary molar has been prematurely extracted, a one-piece cast appliance is designed with the crown on the second primary molar supporting a bar to the primary cuspid with small extensions (1 millimeter) to the incisal, labial, and lingual surfaces of this tooth (Figs. 18 and 19). The extensions on the primary cuspid will increase the stability of this cantilever type of appliance. In order to prevent caries and retention of food, the part of the bar which is in contact with the cuspid is highly polished.

Casting with Abutments and Bar—Where a second primary molar is lost and the six-year molar has erupted, a one-piece casting is used with two abutments on the primary cuspid and first molar supporting a bar to the mesial of the six-year molar (Figs. 20 and 21). That part of the bar which is in contact with the tooth must be highly polished to prevent retention of food.

Variation of Bar—Where a second primary molar is lost and the first permanent molar is unerupted, an appliance with a similar number of abutments is used; but the bar, besides extending distally, is dropped vertically through the alveolar bone where it will guide the six-year molar to erupt into its proper position (Figs. 22 and 23).

Similar Type of Appliance—The same type of appliance is also indicated where the six-year molar is impacted against the second deciduous molar, causing a resorption of the distal of the primary tooth (Fig. 24). Rather than wait for an acute flare-up, the second primary molar is extracted and a space maintainer is employed.

18. *Space maintainer for missing mandibular primary first molar. Note that the first bicuspid has begun to erupt.*

19. *Removal of bar, allowing cuspid to erupt normally.*

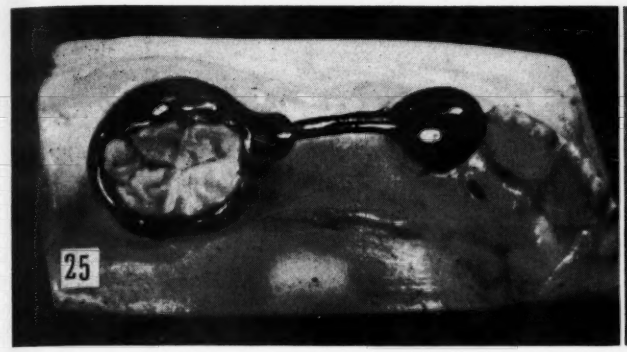
20. *Space maintainer for missing second primary molar. The first permanent molar has erupted.*

21. *Simultaneous eruption of bicuspids and cuspid under appliance shown in Figure 20. In this case the appliance can be easily removed with the abutment teeth which are about to be shed. Note: As the cuspid will not shed until later the appliance is frequently adjusted by cutting between the abutment teeth with a disc.*

22. *Appliance used where the second primary molar is missing and the six-year molar is unerupted. Note how the alveolar extension guides the erupting six-year molar into position.*

23. *Adjustment of appliance shown in Figure 22 after six-year molar has erupted. Note: For best results the vertical extension should be cut after the appliance has been carefully removed from the abutment teeth. The adjusted maintainer is then recemented.*

24. *Impaction of the erupting six-year molar against the distal of the second primary molar. Note the resorption of the distal root.*



25. ***Two-piece casting used for unilateral space maintenance.***

26. ***Preparation of primary cuspid for greater retention of appliance shown in Figure 25.***

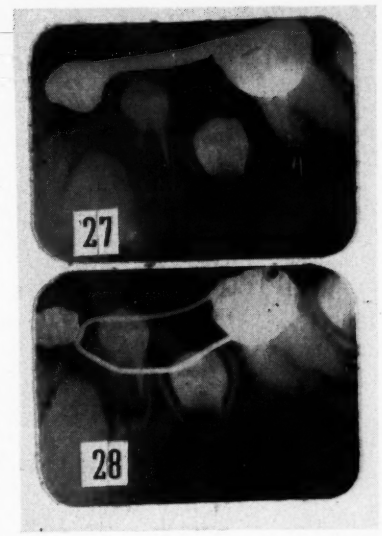
Maintenance for Second Bicuspid—Later, when the six-year molar erupts, the vertical part of the bar is removed and the appliance continues to maintain the space for the second bicuspid.

Use of Two-Piece Casting—Where both primary molars are missing in a quadrant (although the opposite side is intact) and the six-year molar has erupted, a two-piece casting is used (Fig. 25). Here, because the six-year molar is (1) partly erupted, (2) is therefore lacking in vertical height, and (3) the primary cuspid is rather short, this type of appliance is less apt to be dislodged during the mastication of sticky foods.

Description: The appliance consists of two parts: a cast band with a loop on the six-year molar into which fits a bar running from the crown of the cuspid which has been prepared with buccal and lingual grooves for greater retention (Fig. 26).

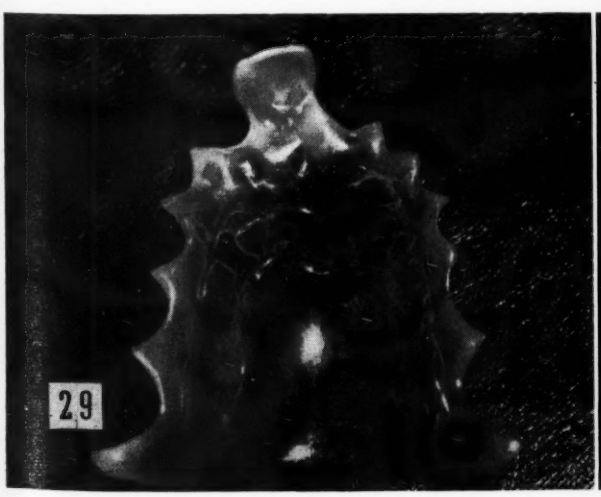
Dimensional Change Prevented: By designing this appliance in two parts, dimensional change which may occur in a one-piece casting over such a large span is avoided. The permanent tooth is protected because it has a more accurately fitting band.

Later Adaptation: If the first bicuspid erupts far in advance of the second bicuspid (1) the bar is cut from the distal of the cast cuspid crown, (2) the molar band is removed,

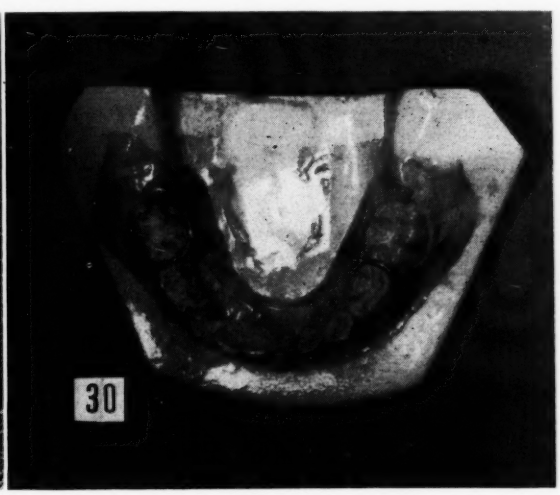


27. ***Roentgenogram of appliance shown in Figure 25. The first bicuspid is erupting far in advance of the second bicuspid.***

28. ***Replacing of horizontal bar with crib wire on appliance shown in Figures 26 and 27 to permit normal eruption of the first bicuspid.***



29. ***One-tooth partial. For greater retention buccal arm clasps can be placed on the six-year molars.***



30. ***One-tooth partial for a missing primary mandibular incisor. Note the crowded condition of the incisors. In this case space would soon be lost unless maintained.***

and (3) a crib wire extending to the cuspid is soldered to the band (Figs. 27 and 28). Fortunately, this type of appliance can be used because the second bicuspid will erupt before a marked extrusion can occur.

Additional Indications for Space Maintainers

Where a maxillary permanent incisor is lost, the space is maintained with a one-tooth partial (Fig. 29). Where a mandibular primary incisor has been prematurely lost, a one-tooth partial (Fig. 30) or an orthodontic band with a wire extension can be used.

Method of Observation—When it is

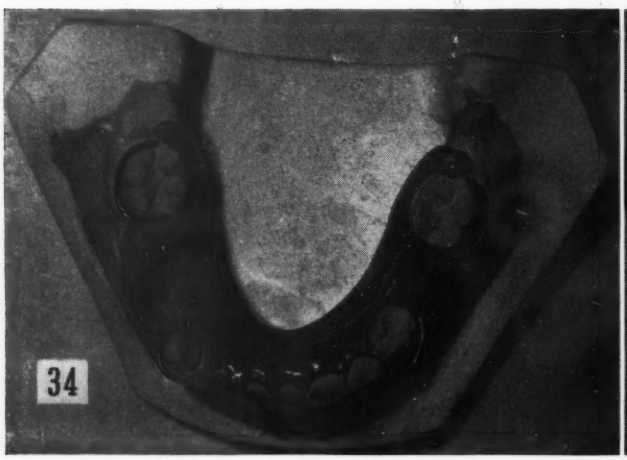
31. ***Acrylic partial replacing maxillary incisors. This type of replacement is especially indicated where an extremely young child is developing a speech defect or a thrusting tongue habit which, during deglutition, displaces food from the mouth. Restoring proper mastication in the anterior part of the mouth prevents malpositioning of the mandible during mastication with resultant disharmony of the developing jaws.***

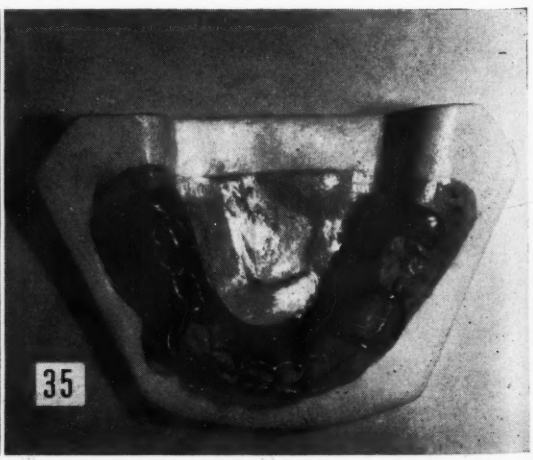
32. ***Missing posterior primary teeth.***

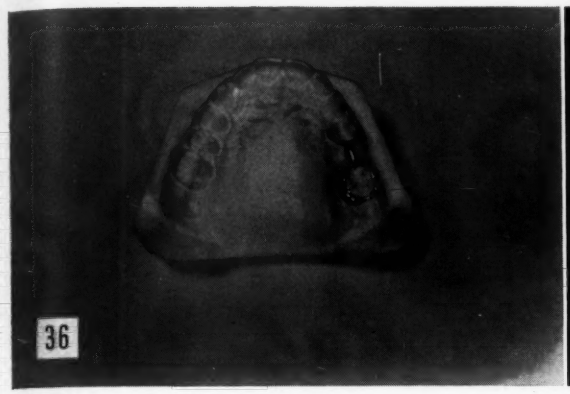
33. ***Partial appliance restoring missing primary posterior teeth.***

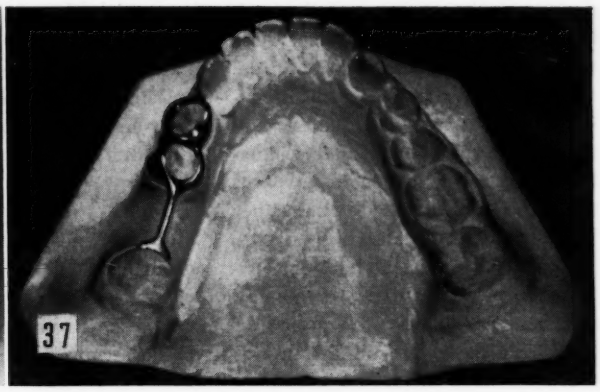
34. ***Appliance used in Figure 33. Note the occlusal carvings in the acrylic material. For greater stability full lingual saddle area has been used rather than a lingual bar.***

35. ***Partial denture for a unilateral case where six-year molars are unerupted. This type of case is not frequently found as there is usually bilateral destruction in a child's mouth. For greater stability the saddle area is extended distally to the second primary molar. This type of case should be observed and adjustments made to allow for the eruption of the six-year molars. Later, when the six-year molars have erupted, the appliance shown in Figure 25 can be used.***









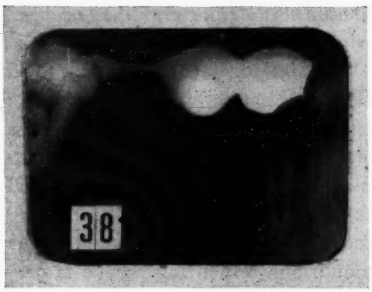
advisable to observe the area a paper clip can be used whose ends have been bent to the size of the space. At intervals of every four weeks the clip can be used to measure the area.

Use of a Bridge—Where two or more primary maxillary incisors have been lost, to prevent space closure and the development of a tongue habit, an appliance supplying the number of missing teeth can be utilized (Fig. 31).

Designing Anterior Fixed Bridges—Two factors must be considered in designing anterior bridges for the primary dentition: (1) lateral growth, and (2) the early eruption of permanent incisors. Therefore, where the span extends across the midline, anterior pontics should be supported in cantilever fashion on both sides of the midline with a sufficient number of cast abutments and joined to each other, if necessary, with a male and female attachment.

To Facilitate Removal: Leonard Kohn[1] suggests that cast bands (castings open at the incisal or occlusal) be used to facilitate the removal of the appliance, when necessary.

Partial Denture Type of Acrylic Retainer—Where the posterior primary teeth are missing and the six-year molars are present or not, a partial denture type of acrylic retainer is recommended (Figs. 32, 33, 34, and 35). Clasps are used temporarily until the child becomes accustomed to the retainer. Shortly after the insertion of this type of appliance the clasps are removed as the child may break or bend them. It is unnecessary to process teeth to the appliance. Rather, the saddle area can be raised to the occlusal level of the adjacent teeth and carvings made in the material.



36. ***One-piece cast functional appliance for a missing bicuspid.***

37. ***One-piece functional casting for a missing six-year molar where the twelve-year molar has erupted.***

38. ***Roentgenogram of appliance*** **shown in Figure 37.**

Retainer may be Removed—In some cases the child may refuse to wear the appliance during meals. The dentist should therefore tell the parent in advance that the child need not use the retainer for mastication. When worn during the day, for hygienic reasons the retainer is cleaned after every meal and removed at night. Where the child prefers not to wear the retainer during the day it can be worn at night. This will at least prevent the drifting and movement of teeth. Later, when the first bicuspids erupt and there is soreness, a crescent section of the saddle of the appliance necessary to relieve the soreness is removed.

Passive Lingual Arch Recommended—For the older child where (1) three or more primary molars are missing in a single arch, and (2) where one or more first bicuspids are about to erupt, obviously the partial

39. ***Cast appliance for a missing six-year molar where the twelve-year molar is unerupted.***

[1]Kohn, Leonard: In Hogeboom, Floyde E.: Practical Pedodontia, St. Louis, C. V. Mosby Company, 1946, p. 278.

denture or the casting with the horizontal bar cannot be used since these will interfere with the eruption of the first bicuspids. Since it will be a matter of a year or less until the first and second bicuspids erupt in this situation the passive lingual arch type of appliance can be used with either wrought or cast bands (Fig. 15).

Extraction of the Mandibular Primary Cuspids: This type of appliance can be used because the period of time in which the remaining bicuspids will erupt is too short for a marked extrusion of the opposing teeth to occur. To allow for self-improvement of crowded or rotated mandibular permanent incisors Foster[2] recommends the extraction of the mandibular primary cuspids in children under nine.

Prevention of Lingual Extrusion Movement: The use of the carefully fitted lingual arch immediately after the extraction will, in his opinion, prevent lingual extrusion movement of the incisors or their relapse after eruption of the permanent cuspids.

One-piece Cast Appliance—Where the second bicuspid is (1) congenitally missing, or (2) lost from caries or trauma, a one-piece cast appliance consisting of a band on the six-year molar and a bar running to the distal of the first bicuspid can be used (Fig. 36).

Double Abutments Required with Wrought Bands: Where the first bicuspid is congenitally missing or has been extracted, a similar type of appliance can be used with a cast band on the second bicuspid and the bar extending to the cuspid. If wrought bands are used in these cases, double abutments supporting the occlusal wire must be employed.

Adaptation of Stainless Steel Bands: Fingeroth[3] recommends an excellent technique in which stainless steel bands are adapted to the abutment teeth and welded to a band equal to the space created by the missing tooth. The appliance is placed in the mouth and self-curing acrylic is processed in the pontic band according to the patient's occlusion. However, this procedure is recommended primarily for orthodontists who are skilled in manipulating stainless steel.

Use of One-piece Casting—Where the six-year molar is missing and the twelve-year molar has erupted, a one-piece casting consisting of two bicuspid bands with a bar running to the mesial of the twelve-year molar is used (Figs. 37 and 38). A similar type of appliance is made where the six-year molar has been extracted and the twelve-year molar is unerupted. In this case the bar is extended vertically through the alveolar bone to guide the eruption of the twelve-year molar (Fig. 39).

The appliances for the missing bicuspids and six-year molar are used where a decision has been made to maintain the spaces rather than close them orthodontically. As complete root calcification usually occurs four to five years after a tooth erupts, seventeen years is the minimum age for the preparation of posterior teeth as abutments for stationary bridges.

(*To be continued next month*)

299 *Clinton Avenue.*

[2]Foster, Herbert R.: An Analysis of the Developing Dentition, J.A.D.A. **42**:376-387 (April) 1951.

[3]Fingeroth, A. I.: Immediate Space Retention and Anchorage, Am. J. Orth. **37**:350-354 (May) 1951.

Sensitization to Denture Material as a Cause of Angular Stomatitis

(*Continued from page* 65)

that has been described. (3) A patch test to the denture was strongly positive.

Treatment—She was advised to change to a vulcanite denture. Three years later she wrote that she had had a slight recurrence about a year previously which quickly responded to treatment.

Case 3—A woman of 44 had had cracks at the corners of the mouth for three years continuously despite various forms of treatment. She first had artificial teeth eight years previously and had since noted soreness from time to time.

Examination—There were deep cracks at the corners of her mouth and the mucous membrane showed the changes seen in the other patients. The dentures were made of red vulcanite and a patch test was strongly positive.

Treatment—She was fitted with "plastic" dentures. A few months later the cracks had entirely disappeared, her skin was clear, and she was free from ulcers.

Case 4—A woman aged 39 came to the out-patient department of the hospital with an infected mole. Angular stomatitis had been present for five and a half years. She had worn vulcanite dentures for about six years. Examination revealed the characteristic redness of the denture-contact area. A patch test when first tried was negative, but when repeated a delayed positive result was obtained. The patient was fitted with new teeth and the cracks have completely healed.

Case 5—A woman aged 58 had had cracks at the angles of the mouth for many years despite various kinds of treatment. She had worn black vulcanite dentures for thirty-five years. The mucous membrane showed the characteristic appearance and a patch test to the denture was strongly positive. She has now stopped wearing dentures and the condition is improved.

Comment

These cases establish the association between denture sensitization and angular stomatitis. It is of interest that all these patients were in the habit of keeping their dentures in at night, and it is reasonable to believe that such a practice leads more readily to the establishment of a contact sensitization. In view of the numbers of dentures worn this condition is relatively uncommon, but in all the cases cited the tissue sensitivity was discovered only by direct questioning and examination so that probably many cases are missed.

Adapted from British Medical Journal No. **4636**:1091-1092 (November 12) 1949.

BENNETT'S MOVEMENT

Presented Roentgenographically

LEONARD FRANK, San Francisco

DIGEST

The purpose of this investigation has been to produce by means of roentgenograms a visualization of Bennett's movement in the living human being. The method used enables the observer to see the movement from three planes or views: (1) the coronal view or horizontal plane, (2) the front view or vertical plane, and (3) the side view or lateral plane.

The methods by which the study was made, the procedure for making composite tracings of the roentgenograms, and a detailed analysis of each of the tracings illustrated, are given.

Bennett's Contribution

On 27 April, 1908, addressing the Odontological Section of the Royal Society of Medicine, Norman G. Bennett, M.B., L.D.S.[1] read his now historic paper entitled a CONTRIBUTION TO THE STUDY OF THE MOVEMENTS OF THE MANDIBLE. It was this paper that heralded the now famous "Bennett's Movement" although, curiously, this was not the primary purpose of the paper.

Primary Purpose

According to his statement in his paper, Bennett's primary purpose was the following: "Furthermore a fixed center of rotation, outside the condyle, for the ordinary movement of opening and closing, has been supposed to exist, and much discussion (futile discussion, I may venture to call it) has taken place as to its exact position. *I shall try to show you that no single fixed center exists*, but that the center of rotation is constantly shifting. A path may be marked out showing the successive positions of the instantaneous center of rotation for any given movement of opening and closing and this path varies with the character of the movement." This was the primary purpose of Bennett's paper. Out of this paper emerged "Bennett's Movement."

Variety of Descriptions

Bennett's movement has been described (1) theoretically, (2) mathematically, (3) anatomically, (4) delineated by Gothic arch tracings, (5) by condylar tracings (Gysi[2] about 1914), and (6) examined by dissections in the cadaver. As far as the author knows, however, these movements have not been demonstrated roentgenographically. This method would seem to be the more practical approach inasmuch as it permits the investigator actually to visualize, in the living human being, the different positions that the condyle assumes as the mandible, through nerve impulse, is activated by the muscles.

Methods of Investigation

In the present investigation three methods were used, one to complement the other, in order to prove or disprove the validity of the conclusions. Three roentgenograms were made with each method: (1) of the mandible in occlusion, (2) of the mandible in working position on the right side, and (3) of the mandible in working position on the left side.

Method 1—The patient lies prone on a table with the chin, stretched as far forward as possible, resting on a film changer equipped with head clamps to immobilize the head.

This method permits the investigator to view the mandible and its condyles as an entity, showing its rotational movement (Fig. 1) as though he were looking from above downward, with the top half of the skull removed.

Method 2—The patient lies supine on the table. The central rays are directed, at an angle, through the superior-medial quadrant of the eye, using the Zimmer[3] technique as described by the author[4] in an earlier paper. This technique affords a frontal view of the condyle with its side-to-side movement (Fig. 2).

Method 3—The patient is turned on his side and a lateral view of the jaw and its condyle is made (Fig. 3) which permits the investigator to evaluate the mesio-distal movement of the condyle as it moves back and forth along its articulation.

Positions and Movements of the Condyles Traced—In each of the three methods, after the roentgenograms are completed, a composite tracing is made providing (1) a comparative estimate of the distance traveled by the condyle, (2) the direction

[1]Bennett, Norman G.: A Contribution to the Study of the Movements of the Mandible, Odontological Section, Proc. Roy. Soc. Med. (April 27) 1908.

[2]Gysi, Alfred: Prosthetic Articulation, New York, The Dentists' Supply Co., 1914, pp. 148-150.

[3]Zimmer, E. A.: Die Roentgenologie des Kiefergelenkes, Ztscher. f. Zahnheilk **51**:No. 12 (December) 1941.

[4]Frank, Leonard: Frontal Examination of the Condyle, DENTAL DIGEST **55**:506-509 (November) 1941.

taken by each movement, (3) the comparative positions of the condyles, one to the other, revealing the asymmetric positions of the condyles; and (4) the cant of the condyles in relation to the skull as a whole.

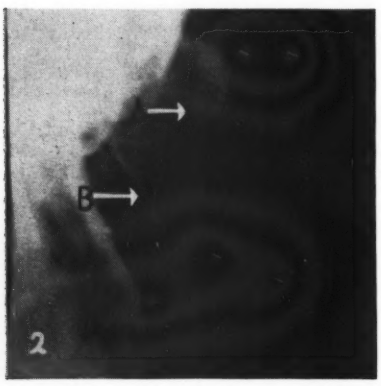
Procedure for Making the Composite Tracings

A tracing plastic, manufactured for this purpose, can be procured at most art stores. The following steps are taken: 1. Place the roentgenogram that was made with the mandible in occlusion on an illuminated surface. Lay the tracing plastic on it and secure the two together, on one edge, with Scotch tape, so that the plastic cannot slip out of position. Trace in all important points with a black pencil. Remove the tracing plastic.

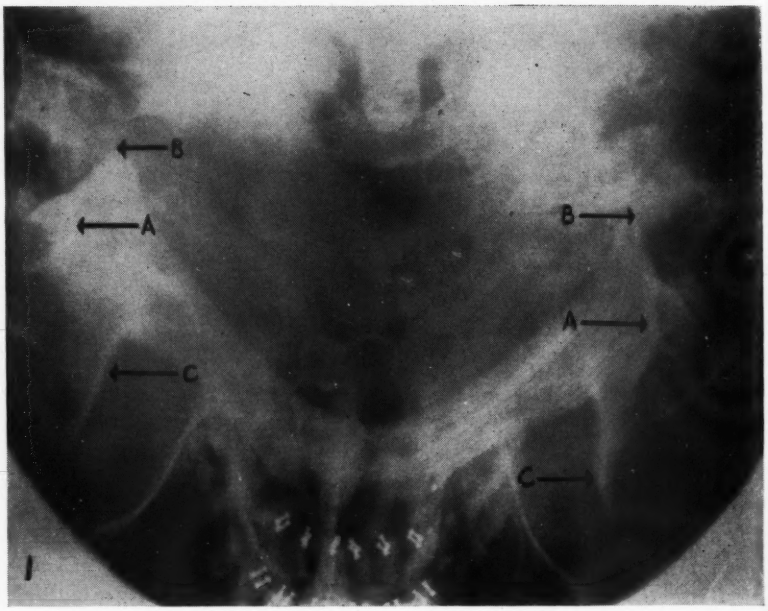
(2) Place the tracing plastic on the roentgenogram that was made with the mandible in working position on the left side. Use the same procedure but this time make the tracing with a red pencil. Remove the tracing plastic.

(3) Place the tracing plastic on the roentgenogram that was made with the mandible in working position on the right side. Use the same procedure but this time use a green pencil to make the tracing.

(4) Make a composite tracing of each of the three methods. When all steps have been completed the result will be a composite comparison of the mandible and its condyles in three positions, describing Bennett's movement as illustrated in Figures 4, 5, and 6.



2. ***Frontal view of the condyle. (A) Articular tubercle. (B) Condyle.***



1. ***Coronal view of the mandible as a whole. (A) Condyle. (B) Angle of the jaw. (C) Coronoid process.***

Differing Opinions of the Working Condyle

Bennett's movement has been described by many investigators. The descriptions would seem to fall into two classifications in relation to the movement of the condyle with the mandible in working position: (1) that the condyle remains static in the fossa, rotating slightly on its long axis, and (2) that the condyle moves slightly down and forward, rotating on its hinge axis and displacing laterally away from the median line.

Descriptions of Movements—Gysi[5] reported the slight forward, downward and outward movement of the working condyle as early as 1914. Sicher[6] stated "In right lateral movement of the lower jaw the right condyle does, however, not rotate in situ, as was formerly believed, but moves only slightly forward and outward. This movement is known as Bennett's Movement." Charles[7] observed, "If the movement be a lateral one they (the condyles) still come out of the fossa and travel downward and forward and outward or inward, but they return to their positions of rest at different speeds because one has a greater distance to travel than the other."

Opinions Unconfirmed—The roentgenographic evidence does not appear to conform with any of these opinions in reference to the working condyle, as will be shown later.

Analysis of Tracing Shown in Figure 4

(1) B and B^1 show the condyles in their fossae with the mandible in centric occlusion.

(2) A and A^1 show the positions of the condyles with the mandible in working position on the right, A, and balance position on the left, A^1.

It will be observed that the working condyle, A, has moved backward and outward, away from the median line, as compared with the condyle, B, in centric occlusion. This movement of the working condyle does not appear to conform with the opinion of any of the writers quoted. The balancing condyle, A^1, has moved forward and inward, toward the median line, as compared with condyle B^1 in centric occlusion.

[5]Gysi, Alfred: Prosthetic Articulation, New York, The Dentists' Supply Co., 1914, pp. 148-150.

[6]Sicher, Harry: Oral Anatomy, St. Louis, C. V. Mosby Company, 1949, p. 171.

[7]Charles, S. Wilson: The Normal Movements of the Mandible, Brit. Dent. J. **46**:284 (March) 1925.

3. *Lateral view of the mandible.*

(3) C and C^1 reveal the positions of the condyles with the mandible in working position on the left side, C^1, and balancing position on the right, C. Again it will be observed that the working condyle, C^1, has moved backward and outward, away from the median line, as compared with condyle B^1 in centric occlusion. The balancing condyle, C, has moved forward and inward, toward the median line, as compared with condyle B in centric occlusion.

Definite Pattern Revealed—An examination of the skull will show that the glenoid fossae are placed obliquely in relation to the skull as a whole. A straight line drawn through each fossa would converge in the vicinity of the foramen magnum. Roentgenographic examination of the cant of the path of the condyles in their fossae, moving from working to occlusal to balance positions, reveal a definite pattern:

(A) The condyles move forward from an outer point, obliquely, to an inner point toward the median line, and (B) conversely, they move from an inner point, obliquely, backwards to an outer point, away from the median line. This pattern was constant in all cases examined.

Former Conclusions Disproved—In a previous article the author[8] reported that in working and balance positions (1) the condyle displaced out of the fossa *inward* toward the median line, in balance position; and (2) displaced out of the fossa, in working position, *away* from the median line.

In the light of the later investigations described it is apparent that these former opinions were unfounded: these movements are not a displacement, the condyle is merely moving in a normal pattern following the oblique cant of the glenoid fossae.

More concisely, (1) the forward movement of the condyle is to an *inner* point, and (2) the backward movement of the condyle is to an *outer* point within the confines of their articular surfaces.

Movements Revealed by Tracing—1. A further study of the tracing reveals how closely the angle of the right jaw, E F G, and the angle of the left jaw, E^1 F^1 G^1, follow the movements of their condyles.

2. The tracing also reveals the right coronoid process, H I J, and the left coronoid process, H^1 I^1 J^1, following the movements of their condyles just as closely as the angle of the jaw.

3. This similarity of movement is, of course, natural, as all parts described are part of the same bone, the mandible, and as this bone moves its parts move with it.

Condylar Asymmetry

In the tracing, B and B^1 show the positions of the right and left condyles with the mandible in occlusion. The central points of these condyles were determined, D and D^1; these points were connected by line K. This line goes from point to point at a slight angle showing that the positions of the right and left condyles are not symmetrical.

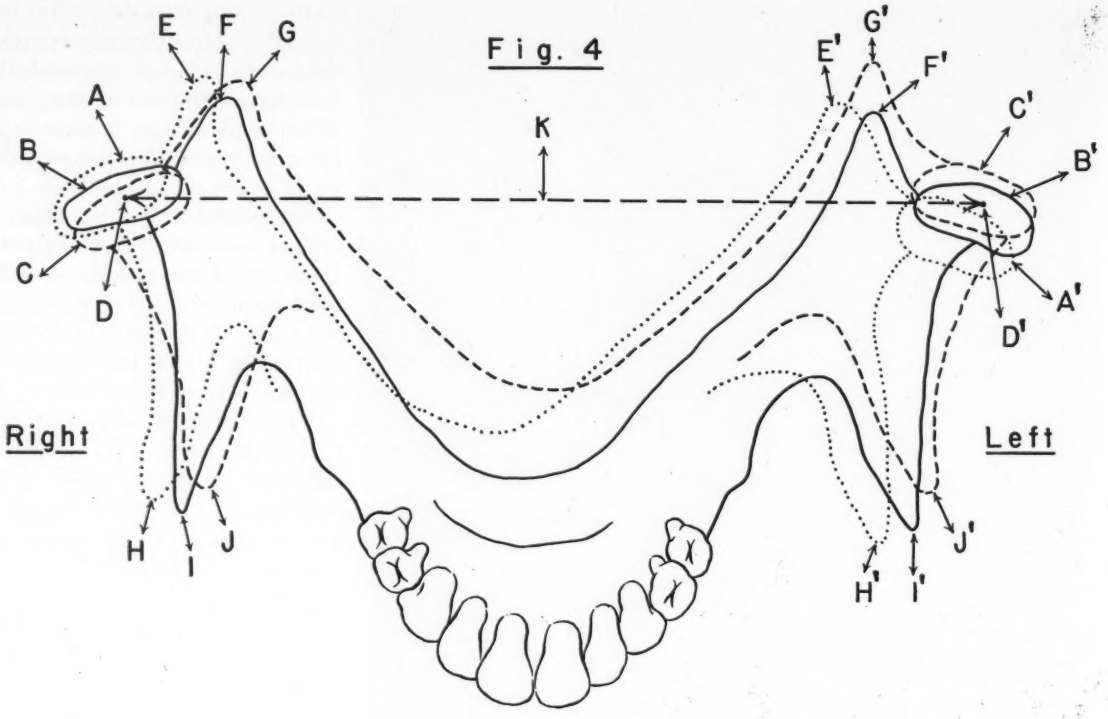
Page[9] stated, "Condyles are never alined symmetrically, one condyle will be higher, lower, anterior or posterior to the other. There will be as many asymmetrical combinations of condyles as there are human beings."

Analysis of Tracing Shown in Figure 5

The tracing of Method 2 shows the frontal view of the condyle revealing Bennett's movement as the condyle moves from side to side, up and down, to and from the median line.

[8]Frank, Leonard: A Report on the Normal Movements of the Condyle, DENTAL DIGEST **54**:540-551 (December) 1948.

[9]Page, Harry L.: Centric and the Hinge Axis, DENTAL DIGEST **57**:115-117 (March) 1951.



Positions of the Condyle—The articular tubercle is designated as A, and E is the median line. C shows the condyle in centric occlusion. B shows the condyle in working position. It has moved outward, away from the median line, and slightly downward as compared to condyle C in centric occlusion. D is the condyle in balance position. It reveals that the condyle has moved downward and inward toward the median line as compared with condyle C in centric occlusion.

A Constant Pattern—The outward and inward and downward movement of the condyle is a constant pattern showing the same characteristics in all patients examined, the only difference being in degree. The upward or downward movement of the condyle, in working position, was not constant; this characteristic was more or less evenly divided.

Analysis of Tracing Shown in Figure 6

The tracing of Method 3, the lateral view of the condyle, shows the mesiodistal path of Bennett's movement as the condyle moves back and forth along its articulation.

A is the position of the glenoid fossa. C is the condyle in centric occlusion. B is the condyle in working position, showing that it has moved slightly backward as compared to condyle C in centric occlusion. D reveals the condyle in balance position, showing that the condyle has dropped down and moved forward as compared to condyle C in centric occlusion. These movements were constant in all patients examined, the only difference being in degree. Again, the upward and downward movement of the condyle was not constant in working position.

***4.** Coronal view. This view reveals the entire mandible and permits the observer to follow both condyles as they move in the horizontal plane. A-B-C on the right and A^1-B^1-C^1 on the left show the condyles as they move from working to occlusal to balance positions. E-F-G on the right and E^1-F^1-G^1 on the left reveal the movements of the right and left angle of the mandible. H-I-J on the right and H^1-I^1-J^1 on the left reveal the movements of the coronoid process. Line K connects D and D^1 placed in the center of B and B^1 which designate the condyles with the mandible in occlusion. This line is slightly oblique, showing the asymmetrical positions of the condyles.*

Summary

1. The movement of the condyle, in working position, is apparently backward and outward away from the median line and posterior to the condyle in centric occlusion. The backward movement of the condyle may be questioned but it must be borne in mind that this is not a pure retrusive movement. It is a rotary movement.

2. The movement of the condyle, in balance position, is apparently downward and forward and inward toward the median line.

3. The cant of the moving condyle is an oblique line, moving inward as it moves forward and outward as it moves backward. These movements

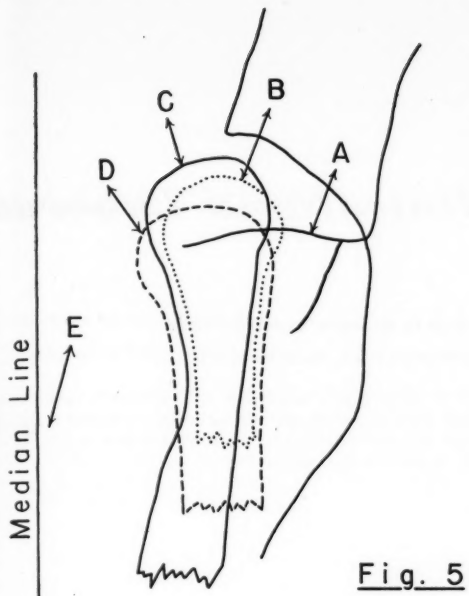


Fig. 5

FRONTAL VIEW

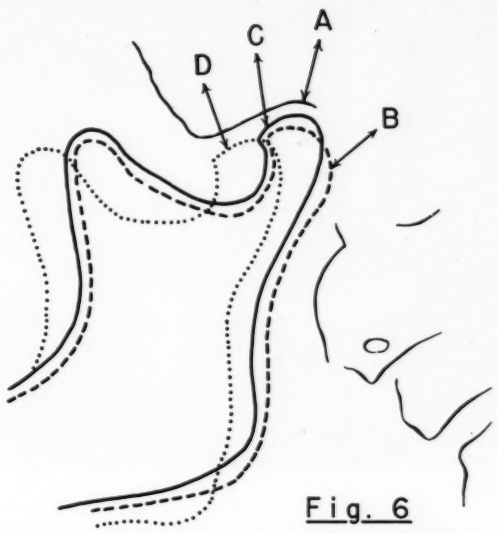


Fig. 6

LATERAL VIEW

5. ***Frontal view. This view of the condyle permits the observer to follow the condyle as it moves in the vertical plane to and from the median line. A is the articular tubercle and E is the median line. B reveals the position of the condyle with the mandible in working position; C reveals the condyle with the mandible in occlusion; and D reveals the condyle with the mandible in balance position.***

6. ***Lateral view. This view permits the observer to follow the movements of the condyle as it moves back and forth mesiodistally along the articular surface of the glenoid fossa. A designates the glenoid fossa; B shows the condyle with the mandible in working position; C shows the condyle with the mandible in occlusion; and D shows the condyle with the mandible in balance position.***

---

are a reflection of the oblique position of the fossae in relation to the skull as a whole.

4. In all patients examined no condyle was found to be symmetrical with its opponent.

5. It does not seem possible that the symmetrically placed condyles of the mechanical articulator can simulate the asymmetrically placed condyles of the human being.

6. Bennett's movement reveals a constant pattern moving back and forth in the fossae and to and from the median line, the only variation being in degree.

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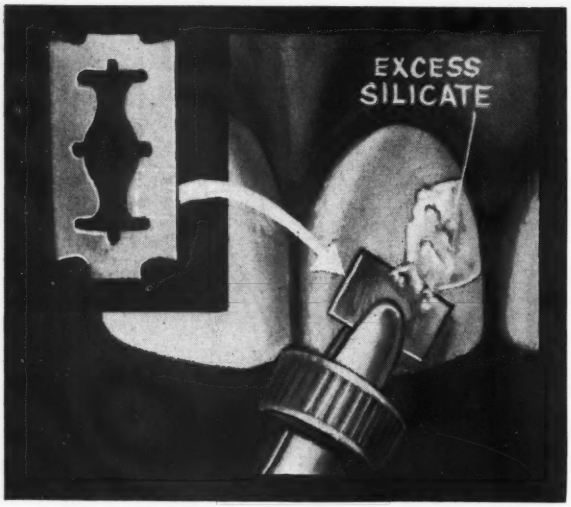


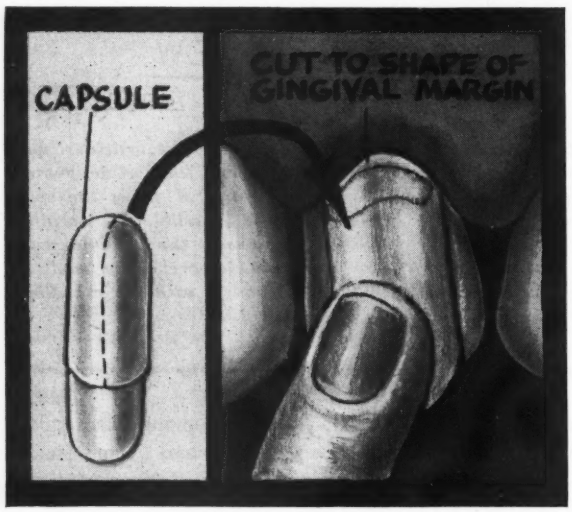
1

Clinical and Laborator

Instrument to Remove Excess Silicate

Martin H. Berman, D.D.S., Floral Park, N.Y.

1. Split a razor blade lengthwise and remove a piece about one-quarter inch in width. Set this piece in a Number 2 pinslide and tighten securely. This instrument is used with a simple shaving action to remove excess silicate.

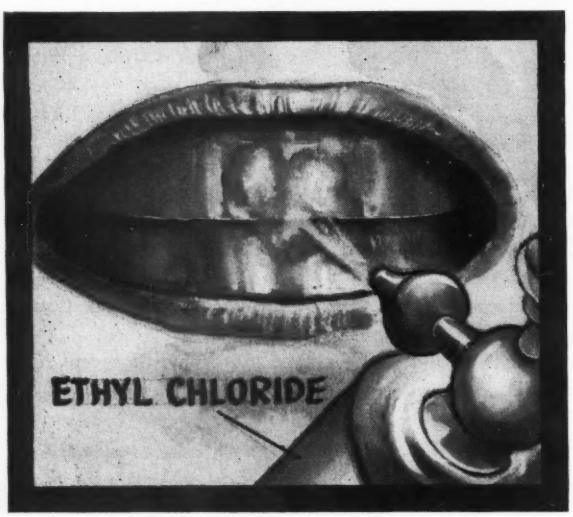


2

Matrix for Class 5 Cavities

Edward Gershkow, D.D.S., Philadelphia, Pa.

2. Separate a capsule and cut the longer portion longitudinally into equal parts. When cut to proper tooth contour and form, the piece of capsule may be used for a matrix for Class 5 restorations.



3

Rapid Chilling of a Wax Bite

Maurice J. Teitelbaum, D.D.S., Newark, N.J

3. When it is inconvenient to use ice water to chill a wax bite spray ethyl chloride on the wax. This will chill the wax quickly and efficiently.

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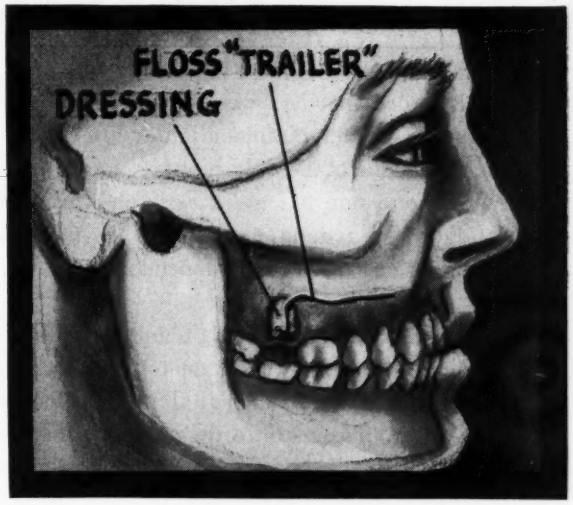
SUGGESTIONS . . .

Removable Surgical Dressings

Francis M. Foster, D.D.S., Richmond, Va.

4. When it is inconvenient for the patient to return to have a surgical dressing removed: Attach a piece of dental floss to one end of the dressing and carry the floss "trailer" into the muco-buccal fold. At the appropriate time the patient removes the dressing by "pulling on the string" that has been tucked under the cheek or lip.

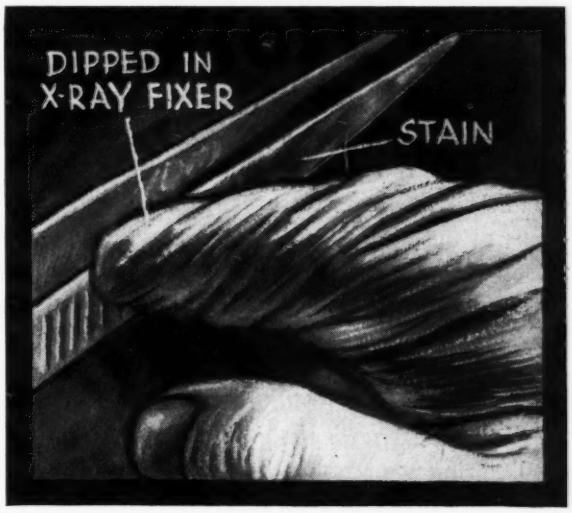


4

Removal of Iodine Stains

Walter P. Raven, D.D.S., Plains, Pa.

5. To remove iodine stains from office equipment or from the fingers, dip a corner of a towel into the x-ray fixer solution and use this moistened piece of cloth to wipe away the stain.

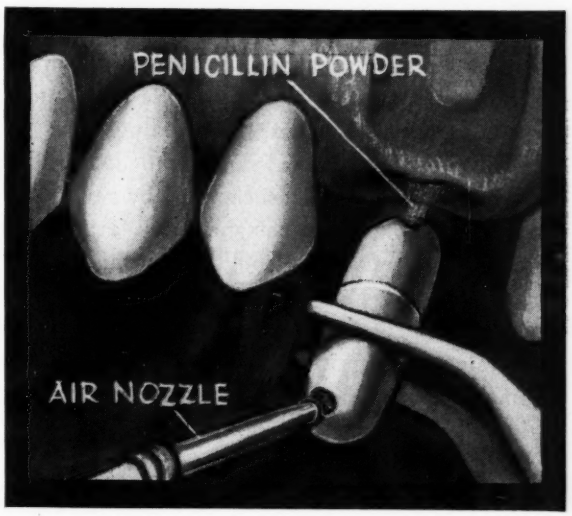


5

A Simple Method of Insufflation

H. J. Merkeley, D.D.S., M.D.S., Winnipeg, Manitoba, Canada

6. To insufflate an upper socket or surgical wound, place two parts of penicillin powder mixed with one part of denture adhesive powder into a capsule that has a side hole and an end hole bored into it. Attach the air nozzle to the side hole and use a blast of air to blow the powder into the socket. The adhesive powder lessens the rate of dissolution of the penicillin and helps to retain it in place for a longer time.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 90 for a convenient form to use.

Send your ideas to: Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S Page

FOR EVERY word that is spoken, for every morsel that is chewed, the temporomandibular joint comes into function. This is the only bilateral joint in the body. When one side functions, as in chewing, the other side must assume a position of balance. Neither joint can function independently of the other.

In common with all joints the temporomandibular is subject to congenital, inflammatory, traumatic, and neoplastic disease. Congenital malformations and tumors are of concern to the surgeon. Inflammatory and traumatic disease of the temporomandibular joint are of particular interest to the dentist. The traumatic implications are notably important because of their association with dental pathology and restorative dentistry.

Any structure that is concerned in the important life processes of eating and speech and that is in such intimate anatomic relationship to cranial structures is likely to be identified with pathologic conditions involving the organs of hearing, irritations of the neighboring cranial nerves, and with disturbances of tissues in the infratemporal fossa and with the proximating intracranial contents. Because of its position in the anatomic scheme it is little wonder that all manner of bizarre syndromes have been associated with disturbances in the temporomandibular articulation.

To bring some order out of the confusion that has been associated with the structure and function of the temporomandibular joint, a valuable monograph[1] has been published with contributions by a galaxy of five prominent basic biologic scientists and dental clinicians (Brodie, Sicher, Thompson, Weinmann, Zimmermann). The editor of the monograph, Bernard G. Sarnat, states the purpose: "To bring some of the knowledge up to date and to correct some of the misconceptions by review and analysis of the temporomandibular articulation from the point of view of both the basic and clinical sciences."

As an example of forthright exposition there is this statement of critical analysis of Costen's syndrome (impaired hearing; stuffiness, buzzing, dull pain in the ears; mild dizziness; "sinus" symptoms; headache in the vertex and occipital regions; burning sensations in the tongue and throat):

"1. The pterygoid muscles do not bulge appreciably in temporomandibular joint dysfunction. Conditions of muscular balance and of tonus must be appreciated. Costen's concepts of the action of the pterygoid and tensor palati muscles are erroneous.

2. Compression of the cartilaginous portion of the Eustachian tube does not occur as postulated by Costen. Catarrhal conditions of the tubal mucosa are more likely the factors that produce a degree of conduction deafness.

3. There is no proof for temporary trauma or concussion of tympanic structures or of the labyrinth.

4. The temporomandibular joint is not weaker on the mesial side. Irritation of the chorda tympani nerve is not likely to occur by pressure of a mesially displaced condylar head.

5. Impaction and erosion of the tympanic plate do not occur.

6. There is no proof that the bony roof of the glenoid fossa is eroded.

7. Vertex pain does not originate in the dura mater.

8. The auriculotemporal nerve itself is not compressed or irritated in overclosure of the jaws.

Facial, temporal, lingual, vertex and occipital neuralgias are possible as reflex symptoms. They may result through irritations of the capsular branches of the auriculotemporal nerve (fibrosis and arthrosis of the joint in dysfunction).

9. The explanation of glossopharyngeal neuralgia is incorrect.

It is evident that from an anatomic and functional point of view there is only one group of symptoms in Costen's syndrome of mandibular overclosure that has a basis of acceptable facts: trigeminal and occipital neuralgias. All other symptoms are highly questionable. The syndrome as such should be abandoned."

There is not a single field of clinical dentistry that is not concerned with the temporomandibular joint. The clinician who wishes to be secure in his knowledge of structural and functional relationships will find his needs fulfilled by this monograph.

[1]Sarnat, Bernard G. · The Temporomandibular Joint, Springfield, Illinois, Charles C Thomas · Publisher, 1951.

MEDICINE and the Biologic Sciences

Obesity in Pregnancy

Childbearing in the obese pregnant woman is beset with an increased number of hazards. These seem to be related to excessive size. The principal hazards are: (1) a higher incidence of toxemia, (2) larger infants, (3) increased maternal morbidity and mortality, and (4) a higher fetal mortality. Obese woman have a greater incidence of abnormal presentations and require more operative deliveries than patients of average weight.

It has been estimated that about 5 per cent of patients receiving prenatal care weigh 200 pounds or more during pregnancy. During the antepartum course the greatest hazard encountered by the obese pregnant woman is toxemia in some form. Between 30 to 40 per cent have some degree of toxemia. This problem is magnified in the management of the patients because of the frequency of (1) labile blood pressure, (2) dependent edema, and (3) excessive weight gain.

Maternal obesity is more of a problem to the physician during labor than at any other time. Presentation and position of the infant are difficult to ascertain by ordinary abdominal and rectal examination. Obese women show little tendency toward prolonged labors of more than thirty hours or short labors of less than three hours.

Many of the dangers faced by obese women in childbearing are due directly or indirectly to large fetal size. Despite the greater numbers of large infants, Cesarean sections are not necessary in many cases. The incidence, about 5 per cent, is somewhat higher than that noted in normal women.

The complication of postpartum hemorrhage seems to be directly related to obesity. It occurs nearly twice as frequently as in normal patients. The occurrence of excessive blood loss following delivery of the obese patient should always be anticipated.

There is a remarkably low incidence of prematurity. Among women of average weight the accepted premature rate is approximately 11 per cent. In obese patients the rate is between 2 and 3 per cent. Such a fact is striking since hypertension and toxemias of pregnancy, usually the leading cause of prematurity, are found more frequently in obese patients.

Fetal and maternal mortality are slightly increased in obese women. It appears that the principal hazards found during the antepartum period are those of hypertension and toxemia of pregnancy in some form.

Douglas, Gordon Watkins, and Scadron, Eugene N.: The Influence of Obesity in Pregnancy, M. Clin. North America **35**:733-737 (*May*) 1951.

Determination of Deafness in Young Children

The determination of a hearing loss in the extremely young child is a difficult problem. The audiometer cannot be used in the usual manner. Headturning responses of the child to loud sounds are unreliable, since they may be coincidental.

It is important to determine any existing hearing defect before the age of three. Otherwise a child's social development is apt to be retarded.

The use of electroencephalography as an objective measure of auditory perception is one solution to the problem. The test is based on the fact that during sleep any sensory stimulation changes the brain wave rhythm from a "sleeping" to a "waking" pattern.

The test can be performed during the afternoon nap or early in the evening with mild sedation if necessary. A very deep sleep is not desirable since this produces a high threshold for all stimulation. After establishing a base line recording of the brain wave pattern, the examiner employs a standard series of sound stimuli. An arousal reaction, as indicated by a change in the wave pattern, is regarded as evidence of hearing perception.

Electroencephalographic testing has the additional advantage of simultaneously revealing evidence of intracranial disorder, often in the temporal lobes, that explains the hearing loss and differentiates it from loss due to cochlear disease.

Some children with hearing defects show evidence of other clinical abnormalities such as (1) disorders of gait, (2) slowed development, (3) behavorial disturbances and strabismus. Factors of etiologic significance include (1) rubella in the mother during the first trimester of pregnancy, (2) Rh blood type incompatibility, (3) prematurity, (4) twinning and brain injury at birth. Consanguinity, heredity, and syphilis appear to be of little significance in the etiology of hearing defects.

Marcus, R. E.: Hearing and Speech Problems in Children: Observations and Use of Electroencephalography, Arch. Otolaryng. **53**:134-147 (*February*) 1951.

Frozen Foods

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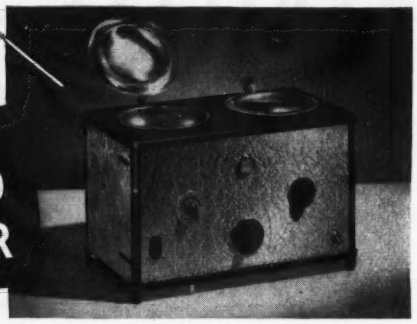

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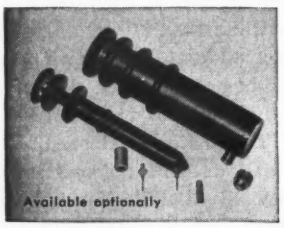

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Much of the loss of the water-soluble vitamins and other water-soluble constituents of vegetables preserved by freezing, canning, or dehydration occurs as the result of the preliminary blanching or precooking to which they are subjected. Blanching is done (1) to inactivate enzymes, (2) retard the subsequent loss of carotene and ascorbic acid during storage, and (3) to prevent the development of undesirable off-flavors. Such losses are minimized when the blanching is completed in the shortest time by the use of boiling water and the use of the same water repeatedly.

The rate of freezing of the food is an important factor in the preservation of vitamins and flavor. Cooling of the center of the package to 0 degrees Fahrenheit in one and one-half to two hours seems to be most desirable. This time may be lengthened without any significant impairment. Freezing time should not be increased beyond twelve hours.

Storage at 0 degrees Fahrenheit is satisfactory when the period is a year or less. Losses become much greater if the temperature is allowed to rise to 10 degrees Fahrenheit or is allowed to fluctuate between 0 degrees and 20 degrees Fahrenheit.

When frozen foods are selected, prepared, and stored according to the best available scientific knowledge they compare favorably in nutrient content and flavor with the fresh fruits and vegetables.

Editorial, Frozen Foods, J.A.M.A. **146**:37-38 (*May* 5) 1951.

orange juice concentrate, the Council on Foods and Nutrition of the American Medical Association has authorized a report accepting several brands and allowing the use of the Council's seal under certain conditions.

The quality of foods whether frozen in home freezers or frozen commercially, depends on three basic facts: (1) selection, (2) shortness of interval between harvesting and packing, and (3) care in processing and storage. Selection for quality and nutritive value of fresh fruits and vegetables depends on such factors as variety, climate, sunlight and soil. Fine flavors and nutritive value often go hand in hand. Fruits, when most highly prized for their flavor, are usually richest in nutrient content.

The retention of flavor as well as nutrient value is generally impaired in direct proportion to the shortness of the time interval between harvesting and food packing. Freezing does not materially alter the nutrient value of foods. Freezing does not split meat proteins or significantly reduce the carotene content of various vegetables.

Ankle Sprain— Treatment

Ankle sprains probably are the most common of orthopedic injuries. There are various methods of treatment and most of them produce satisfactory final results. Those selected for use should allow the patient to return to normal activity as soon as possible.

In the vast majority of ankle sprains the ligaments involved are only slightly injured. These injuries

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are healed by relatively short periods of support to the ankle joint.

Damage is so severe in 5 to 10 per cent of ankle sprains that one or more of the three lateral ankle ligaments is completely torn through. The anterior talofibular ligament is the most important of this group. It is the one most frequently injured.

All severe ankle injuries with marked swelling, discoloration, and pain should be examined and x-rayed under anesthesia to determine whether one or more of the lateral ligaments is completely torn. This condition permits an unusual amount of inversion of the foot. Treatment should include plaster immobilization of the ankle joint for a period of approximately six weeks. In the presence of inadequate immobilization, an unstable joint and prolonged disability will result.

Until recently adhesive strapping was advised as the treatment for sprains with incomplete tears. Most sprains healed satisfactorily but they required long periods of disability. During the war army and navy surgeons injected a local anesthetic into and around the painful areas of the ankle. Walking was entirely possible after the injection. Many men returned to duty immediately with little or no discomfort. The undesirable features of the injection therapy are: (1) it involves the use of needles and sterile solutions and many patients rebel at the thought of injections into already painful areas, and (2) routine infiltrations into damaged areas sooner or later result in contamination and a septic joint with permanent changes in the articulating surfaces.

The use of ethyl chloride spray to obtain relief of pain in ankle sprains is quite extensive at present. After diagnosis to rule out a malleolar fracture or a complete tear of a ligament the patient is instructed to point out the painful areas around the ankle. These areas are then sprayed with ethyl chloride until the skin is blanched and firm. Massage of the tissues is employed to relieve the transitory discomfort of the intensely cold spray. Thereupon the patient is told to stand with full weight on the injured ankle. If pain is still present in

an area not treated, a second spraying is given. The patient is encouraged to walk with full weight on the injured ankle, not favoring it by limping. The ankle is then wrapped snugly with an elastic bandage and the patient returned to normal activity. He is instructed to wear the supporting bandage for ten to fourteen days. Occasionally a second treatment is necessary twelve to twenty-four hours later. This is the exception rather than the rule.

Price, Robert Alexander: Treatment of Ankle Sprain, Postgrad. Med. 9:58-60 (*January*) 1951.

Contra-Angles

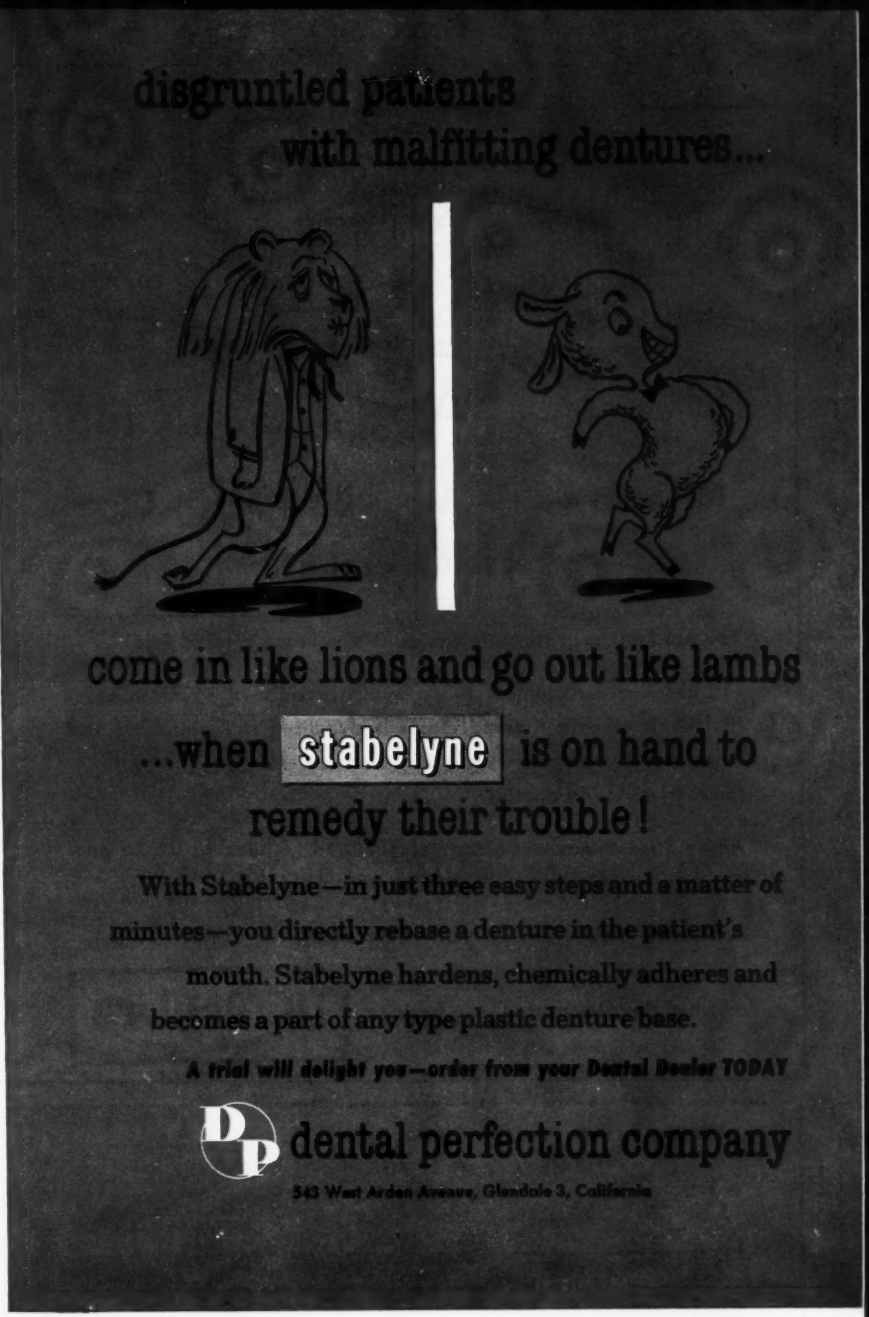
The Sweet Restorer

Often, in a pious state of self-righteousness, somebody says that he guides his conduct during the day so that he can sleep well at night. This alone should not be the test of good behavior. The idea back of this pronouncement is, I suppose, a notion that a troubled conscience causes troubled sleep. Some of the most chronic insomniacs that I have known were pure in heart and action, whereas some of the soundest sleepers were of the criminal element or fringe. I am thinking of the murderer who must be awakened from his sound sleep to walk to the electric chair.

There is some connection between what whirls and darts through the mind by day and what kind of sleep is experienced at night. There is also some relationship between sleep and what we anticipate to follow the next day. Disturbing experiences, or the anticipation of them, influence the sleep pattern for many people. The lack or poor quality of sleep often agitates people out of all proportion to the physical harm involved. The person who makes a fetish of sleep and worries about it can do himself more damage than comes to the one who accepts his sleep routine—be it good or bad—without perturbation.

People who are in pain, or those who do not allow themselves sufficient time in bed, may certainly experience physiologic disturbances from lack of sleep. But the person who allocates eight hours a night for himself in bed and who has learned to block out disturbing thoughts need not worry too much if his sleep seems to be broken and fitful.

One of my psychiatrist friends, Ernst Schmidhofer of Memphis, has developed a technique for therapeutic relaxation. The essence of his approach is that a person can think of only one thing at a time. If we concentrate on a pleasant thought, a relaxing thought, there is no place in the mind to be occupied by a demoralizing one. In the physical world two objects can never occupy the same place at the same time. So it is the same in the mental world. Try some time to think AT THE SAME TIME of the tumult of city traffic and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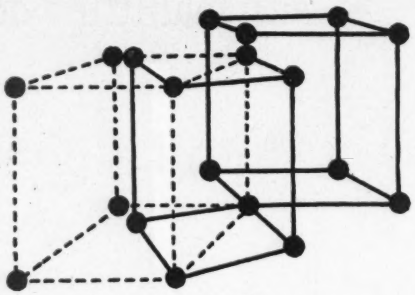

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a quiet trout stream. It can't be done. One thought takes precedence over the other. If the tumultuous thought takes over, the body alerts itself for defense—the heart beats faster, the blood pressure is elevated, digestion is inhibited. If the relaxing, pleasant thought occupies the mind, the body lets down its mobilization for defense—the heart is slowed, the blood pressure drops, the satisfying visceral processes are in ascendancy.

There is a phenomenal relationship that exists between the mind of man and his body. Thought takes place at the higher and newer brain levels, then filters down through the lower and older nervous structures in the hypothalmus, the spinal cord, the autonomic nervous system. The glands of internal secretion and the autonomic nervous system function to express our body feelings, our actions, and our personality.

For centuries we have been implored to think thoughts of peace and not of affliction, to fear not, to experience the joy that surpasseth all understanding. These ideas appear in the sacred writings of all cultures and all people. Now we are beginning to understand in terms of neural structures and pathways, in the chemical formulae of the endocrine secretions that the sacred writers were inspired scientists as well.

There are still some people who smile tolerantly when they hear the suggestion that the mind rules the body. They catalogue such suggestions as arising from cultists and fanatics. If, however, these people examined the most up-to-date scientific writings, they would find substantial evidence to show that modern medicine recognizes that thought and behavior are inseparable, that there is no dichotomy between mind and body, that so-called organic disease can produce behavioral deviations, that distorted thought processes can produce the bodily expressions of disease.

Choosing at random from three authoritative and recent medical publications are these points of view:

JAMA[1]—"Little mention has been made in the general medical literature of the fact that human beings are not constructed alike in nervous reactivity. One may require relatively strong stimuli to produce responses; another may react to the slightest stimulus, such high reactivity representing a prominent inherent characteristic. It is just as important therapeutically to recognize the skittish person as to recognize an organic disease, for only by such recognition is that person enabled to adjust his life to the requirements of his nervous system . . .

"In the evaluation of the causes of symptoms presented by a patient to the physician, much reliance has been placed on what is commonly spoken of as the 'art of medicine.' Step-by-step the art of earlier generations of physicians has been replaced by the science of medicine, to the advantage of both the patient and the physician. In recent years understanding of the psychologic aspects of disease has

[1]White, Asher A.: Evaluation of Psychogenic Symptoms in General Medicine, J.A.M.A. **147**:1524-1525 (Dec. 15) 1951.

been developing rapidly. This understanding has reached the point at which it is possible to develop an objective approach to the analysis of the personality deviations."

GP[2]—"Correlate changes in the psychic state with the occurrence of symptoms. At each visit the physician should note the psychic state of the patient, with particular respect to changes since the previous visit. The occurrence of symptoms at the time of the visit should also be noted. Thus if a patient repeatedly smiles when free of symptoms and looks tense and angry when having a headache, we may assume that there is some correlation. From this alone we cannot tell whether the headache or the mood change comes first. But sometimes we can discover evidence of some preceding stress which might have altered the mood before the headache came on. And sometimes we may ourselves alter the patient's mood, for example by permitting him to discuss emotionally charged material, the symptom may then dramatically melt away. Or the patient may have no symptoms when the visit starts but later show or complain of some physiologic change or symptom such as headache or palpitation. Often this can be related to the topic under discussion at the time and to some emotional disturbance resulting from the discussion.

"Sometimes, even after careful use of the above methods, it may be difficult to establish with certainty a correlation between psychic state and symptoms. This is particularly true when the patient is unwilling or unable to cooperate by giving a full history of his life, his feelings, and his symptoms. A similar difficulty arises when there are marked structural changes so that the symptoms might be entirely attributable to the organic disease. An example is colitis in a patient whose stools contain some amebae, but who also shows considerable psychic disturbance. Is the colitis due to the emotional disturbance, or is the emotional disturbance a reaction to a severe amebic colitis? Again the symptoms of anxiety (such as palpitation and dyspnea) so closely resemble those of heart failure that, if a patient has anxiety and heart failure together, we may have difficulty in deciding which came first. And yet the distinction is of the greatest importance for the proper therapeutic approach.

"In such instances it is desirable to make a therapeutic trial of psychotherapy. This is just as reasonable as the use of therapeutic trials with pharmaceutical agents. It is not necessary to announce such a trial formally to the patient, since if it can be introduced indirectly it may be less disturbing to him. He may have become convinced that his illness is entirely physical, and direct attempts to convince him otherwise will only irritate him. But indirect measures may be taken for the relief of psychic tensions or designed to explore for their existence.

"The psychotherapy does not need to be a highly technical uncovering of deep personality problems. It may

[2]Steven[illegible]o, Ian: Analyzing Psychosomatic Relationships, GP **14**:75-77 (Dec.) 1951.
[3]Editori[illegible], British Medical Journal No. **4742**:126[illegible] (Nov. 24) 1951.

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In your ORAL HYGIENE this month

Malpractice Is Big Business

"If one is honest and conscientious in his practice, what has he to fear?" . . . The answer seems to be, "Malpractice suits."

No matter how careful a dentist may be, he can still be victimized. Last year, in the courts of one state alone (California), malpractice suits filed against dentists amounted to around eight hundred thousand dollars!

Doctor Douglas W. Stephens suggests that dentists protect themselves as completely as possible by insurance, but urges that they take other necessary precautions as well. He believes that the public are more "claim-conscious" than ever before, and that, consequently, the dentist must exercise greater vigilance and care than he has in the past.

★ ★ ★

Have you ever wondered just what part dentists play in projects such as the atom-bomb tests? Doctor Victor J. Klubek, a Connecticut dentist who was stationed at base headquarters on an island near Eniwetok—the testing grounds used by the Atomic Energy Commission for the observation of atomic power—gives you a "dentist's-eye" view of one of the most spectacular scientific experiments ever conducted by man.

★ ★ ★

Here's what looks like a really good argument! The subject is fluoridation of city water supply. You'll remember Doctor G. A. Swendiman's article in Oral Hygiene, "The Argument Against Fluoridating City Water." Now, along comes Doctor Norman R. Joffee claiming that "The case against fluoridation as he [Swendiman] presents it, is so full of holes it makes a sponge seem nonporous." You won't want to miss Doctor Joffee's "Fluoridation: Neither Poison Nor Panacea." It has won Oral Hygiene's $100 Award as the best article of the month.

★ ★ ★

"Fees That Are Fair to Your Patient and You," a continuation of the article that began in the January issue, gives a formula for establishing adequate and fair fees. Stabilizing the financial basis of his dental practice should be one of the first considerations of the young dentist—and certainly maintaining this stabilization is one of the major concerns of the established practitioner. Doctor Meyer M. Silverman's articles should be of great value to both groups.

★ ★ ★

Here's an article that should be attached to your insurance policies. Its advice might be quite useful to your heirs. Albert Woodruff Gray, under the title, "Conditional Sale of a Dental Office," relates the experience of a widow who encountered unexpected legal complications in disposing of her husband's practice.

★ ★ ★

Inflation and taxes have left us all with little enough money in the bank . . . It's important that that money, whatever its amount, be safeguarded by the bank to which we entrust it. Ernst I. Cahn writes an important warning, "Not All Banks Are Insured."

★ ★ ★

Maximum efficiency with minimum detail—that's certainly the ideal in keeping office records. Sylvia Danenbaum writes a most informative article giving detailed explanation of a method that gives the dentist complete assurance that "It's All in the Records."

consist rather in a simple effort to modify the psychic state by a friendly, constructive relationship with the patient, which provides him with a setting for the expression of his feelings, conflicts, and worries. We then watch for changes in the physical signs and symptoms, as the psychic state improves."

British Medical Journal[3]—"Professor M. Bleuler's article in this issue will interest a wider circle of medical men than neurosurgeons, neurologists, and psychiatrists. Within the framework of a general discussion of great theoretical significance he brings out many points of everyday clinical importance. Among these are the facts that mental disturbance may be an early and distinctive sign that there is organic disease of the nervous system, and that structural changes in the brain may release symptoms of a neurotic or functional nature. The reciprocal relationship between brain lesions and changes in the personality and in emotional life is beginning to assume a central importance in psychiatry and in general medicine."

To return to sleep: the physiology of this process is not all understood although the necessity of sleep is beyond question. In an understanding of this vital physiologic process we are at the level of knowledge that we possessed of nutrition about fifty years ago. Then we knew that proper nutrition was necessary for our best health but we knew little or nothing about vitamins, minerals, and the trace elements. Biochemistry brought us an understanding of these facts. Biochemistry, plus electronics, will very likely be the keys to open the mystery of sleep—the phenomenon of living that is so like death.

We are told that the use of sleep-producing drugs is on the increase. Such drugs are advertised in publications and over the radio. Any sedative acts by a chemical road block erected in the higher levels of the nervous system. If consciousness is dimmed, if perception is blighted, if neuromuscular coordination is dulled by chemical agents, the subject operates on a more primitive level of behavior and so sleep, as it does to

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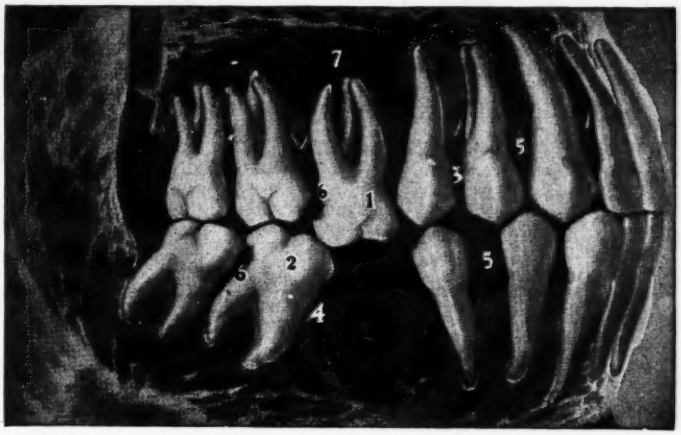

Part of Chart 4, showing the patient what happens when a tooth is not replaced.

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Chart 3—The Progress of Tooth Decay: Three large full-color illustrations show a small cavity starting in the enamel and carry through to the final result: general systemic disease.

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Chart 5—How Irregularities of the Teeth Affect the Face: Another full-color chart which quickly makes clear to parents the perils inherent in neglecting needed orthodontic treatment.

Chart 6—Modern Porcelain Restorations: Four full-color illustrations which patients can comprehend almost at a glance—making clear the advantages, and saving time you might otherwise be forced to use in presenting your recommendations.

Chart 7—The Expense of Poor Dentistry: Eight full-color illustrations make clear, even to an uneducated patient, the folly of cheap dentistry.

Chart 8—The Development of Root-End Infections: Four large full-color illustrations present facts that patients would otherwise not comprehend, and would accordingly neglect treatment.

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(*See pages* 78 *and* 79)

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all lower forms, comes to him without effort. There are times in the lives of people when this kind of blocking is necessary. On most occasions, however, the simple method of placing the body in a relaxed and comfortable position and letting a pleasant thought be the single occupant of the mind will produce the state of quiet sleep. The mind rules the body in sickness and in health, asleep or awake, in poverty and in riches, until death doth us part.—E. J. R.

Histamine As A Factor In Dental Inflammation

MERLE W. OGLE and RALPH B. LYDIC
San Antonio, Texas

NORMALLY A physiologic balance in tissues of the oral cavity is maintained even though a number of factors exist which may predispose to or complicate inflammatory processes. Such factors include: (1) erupting teeth, (2) local irritants, such as fermentative or putrefactive substances, (3) excessive bacterial activity, (4) occlusal trauma, in excess of ability of supporting structures of teeth to resist damage, and (5) other chemical or physical irritants. Conditions may exist in the oral cavity which influence or are influenced by a seemingly remote systemic irregularity.

Allergic and Anaphylactic Manifestations

An example of allergic inflammation is the Arthus phenomenon in which the injection of a substance into an animal previously treated with the same substance results in a severe local reaction. Theories have been advanced that this is caused by (1) a local antigen-antibody reaction; (2) a local concentration of a foreign protein; or (3) a general alteration of the mesenchyme, a hyperergy which increases local reaction.

Role of Allergy in Infectious Diseases—Acute inflammation of the allergic type is seen in cutaneous flares and wheals, diagnostic skin reaction,

coryza, bronchitis, and other conditions which develop in persons who are hypersensitive to specific proteins.

Skin Reactions to Injury—Investigators have suggested that a histamine-like substance is involved in the reactions of the skin to injury and that this substance, held normally within cells, is released by various types of injury and diffusing out, causes the early changes in capillary dilatation and permeability which in turn produce local edema and redness. Investigators have questioned whether or not histamine may play a role in inflammation.

Characteristics of Histamine

Composition — Histamine is a strongly basic, water soluble, white, crystalline compound derived from histadine (one of the essential amino acids) by decarboxylation. It is produced regularly in the intestines by organisms of the Escherichia group. It is present in the tissues generally and even in the leukocytes, but how it is formed in the tissues is not known.

Function—Histamine (1) stimulates the gastric secretion, (2) dilates the capillaries and arterioles, (3) lowers blood pressure, (4) constricts the bronchioles, (5) contracts the sphincter of the hepatic veins, (6) dilates the pial vessels, and (7) raises the pressure of the cerebrospinal fluid. It is an antagonist to epinephrine and probably acts as a stimulus to its production. It is liberated from the tissues in anaphylactic and allergic reactions and is neutralized by histaminase.

A Normal Constituent—Most, if not all, of the body cells which exhibit a vigorous metabolism contain histamine as a normal constituent. Stimuli applied to such cells, if strong enough to entail even mild injury, cause this histamine to be liberated from the cells in sufficient amounts to cause dilatation of the adjacent capillaries to a mildly pathologic degree.

Increase in Histamine—Investigators have shown that well-developed inflammatory areas in laboratory animals and in human beings contain amounts of histamine well above nor-

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mal. It has been clearly shown that this rise in histamine content in inflammation and inflammatory areas is caused by degeneration of accumulated blood platelets in the increased capillary bed in these inflammatory areas. The simplest interpretation of experiments undertaken is that the platelets bring the increased quantity of histamine to areas of inflammation.

Susceptibility of Localized Tissue in Rutin Deficiency—Because of the effect of rutin (vitamin P) on capillary permeability it has been stated that pretreatment with rutin is effective in protecting sensitized animals against anaphylactic shock. This can be correlated with the susceptibility of localized tissue such as gingival margins where there is a localized area of rutin deficiency associated with gingivitis or pocket formations.

Total Cell Destruction has not Occurred—In such conditions total destruction of cells has not taken place as occurs when tissue is destroyed by burns, acute infections, and extreme pressure from fluid exudate in severe contusions; so that histamine has not been destroyed and is present to exert an effect on the tissues or the local areas. In the treatment or drainage of such inflammatory areas, histamine or the histaminelike substance is eliminated.

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Case Report

After a routine dental examination a 33-year-old white woman developed gingival tenderness, urticaria, and swelling of her hands and feet to an extent that made their use difficult. Her tongue was swollen so that speech was difficult.

Treatment—She was given amphetamine which afforded some relief. About one month later no treatment was indicated as she had been symptom free for several weeks.

Recurrence—About six weeks later the patient again had urticaria and moderate swelling of the face following restoration, under local anesthesia, of the carious upper right second bicuspid. It was found that she had a generalized periodontitis.

Treatment of Periodontal Condition—In the early phases of this treatment the patient had a marked exacerbation of symptoms similar to those previously described. After several treatments all symptoms disappeared and she had no further recurrence except for one mild episode about seven months later which responded to an antihistaminic agent within a few hours.

Discussion

In the case reported injured tissues of the traumatized and inflamed areas may have liberated substances to which the patient became sensitive through the mechanism of the Burky phenomenon. The Burky phenomenon is concerned with sensitivity of a person to autogenous tissues. Action of a qualitative and quantitative bacterial toxin in the presence of a suitable combination of factors including inflammatory processes, may foster the production of sensitive or allergic states.

A person might become sensitive to some of his own tissue products as a result of the activity of staphylococcus or other toxins elaborated in a focus of infection or inflammation, but on testing for sensitivity with any number of pure bacterial cultures, all might be negative despite the fact that the toxin of one of these bacteria might have been a sensitizing agent under the influence of necessary combinations.

If it should develop that a toxin produced in a focus of infection or

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inflammation can act as an antigen fraction and increase the antigenicity of ordinarily inert substances, it is conceivable that much of what we consider as nonspecific focal infection may later be shown to be specific.

Adapted from U.S. Armed Forces Medical Journal **2**:1357-1360 (September) 1951.

Surgery of Parotid Tumors

H. S. SHUCKSMITH, F.R.C.S., T. McM. BOYLE, F.R.C.S., D.L.O., and W. K. J. WALLS, M.B., Ch.B., Leeds, England.

Classification

Epithelial salivary gland tumors have been classified as follows: (1) simple adenoma, (2) pleomorphic adenomas and adenocarcinomas (so-called mixed parotid tumors), (3) anaplastic carcinomas, and (4) adenolymphomas (papillary cystadenomas).

Mode of Origin—It has been authoritatively stated than 90 per cent of all salivary tumors fall into the group of pleomorphic adenomas, and that while most of these tumors grow slowly and appear to be well circumscribed they are not strictly benign. It is further stated that the mode of origin of the tumors parallels that of mammary carcinoma which often arises from a considerable field of mammary epithelium.

Recurrence Rate—It is believed that the recurrence rate after inadequate operation may be as large as 62 per cent and that the principal factor in recurrence is the conservative type of operation used because of fear of damage to the facial nerve. It is also suggested that recurrence may arise from small satellite tumors independent of the main one.

Wide Excision Required—The incidence of parotid tumors, other than pleomorphic adenomas, makes any other clinical diagnosis than this unwise (except the obvious cancer); their pathology demands that any surgical treatment should be wide excision.

Surgical Procedure

It seemed advisable to preserve the facial nerve although to resect widely any superficial parotid tumor would require (1) exposure of the main trunk of the facial nerve soon after its emergence from the stylomastoid foramen, and (2) from this large strong trunk to work forward to the main divisions and filaments as need be. This plan is the basis of the method described.

Anatomy—The facial nerve trunk runs one-quarter inch (0.6 centimeter) below the free edge of the tympanic plate. The exposure of the free edge of the tympanic plate is the key to the operation.

Method—1. The parotid and temporomandibular regions are infiltrated with local analgesic to help hemostasis. 2. The incision is liberal, extending from Macewen's triangle a fingerbreadth behind the pinna and just below the external auditory meatus down to the lower border of the mandible; flaps are dissected. 3. The outer border of the tympanic plate is exposed and the main trunk of the nerve found one-quarter inch (0.6 centimeter) below. The nerve is dissected anteriorly; in this forward sweep there is no confusion between fine filaments of nerve, fibrous tissue septa, and tine ducts. 4. The tumor is now excised widely, and after hemostasis the wound is closed with an intracuticular stitch and drained.

Adapted from *British Medical Journal* No. **4735**:830-831 (Oct.) 1951.

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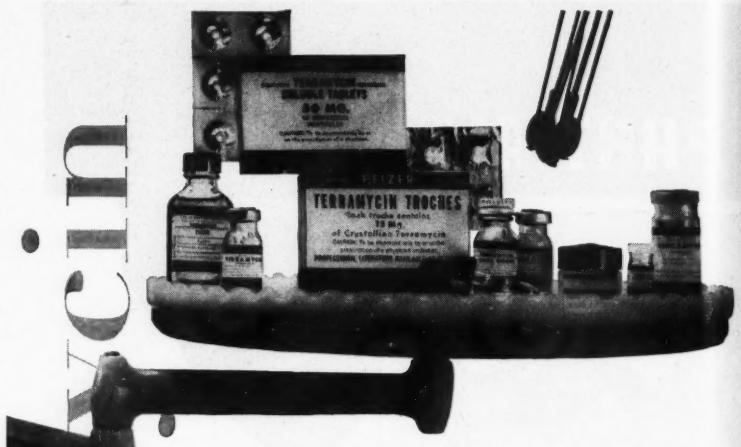

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